A cognitive behavioural model of understanding and improving negative adjustment outcomes for adults with inflammatory bowel disease

Jordan, Cheryl Dawn

Awarding institution:
King's College London

A COGNITIVE BEHAVIOURAL MODEL OF UNDERSTANDING AND IMPROVING NEGATIVE ADJUSTMENT OUTCOMES FOR ADULTS WITH INFLAMMATORY BOWEL DISEASE

by

CHERYL JORDAN

Thesis submitted for the Degree of Doctor of Philosophy

University of London

Department of Psychological Medicine Institute of Psychiatry, Psychology and Neuroscience, London

ABSTRACT

The present research consists of a number of studies which sought to examine the psychological processes associated with negative adjustment outcomes for adults with inflammatory bowel disease (IBD) and considered the potential benefits of a novel psychological intervention for improving outcomes in this population.

The first study in this thesis (Chapter 2) systematically examined the evidence between psychological factors and adjustment outcomes in adults with IBD. Emotion focused coping strategies, perceived stress, IBD related cognitions (such as illness perceptions), emotions and emotional control (such as hostility, aggression and alexithymia), interpersonal traits (such as anxious attachment style) and personality traits (such as neuroticism and perfectionism), were linked to negative adjustment outcomes for adults with IBD after controlling for the influence of sociodemographic and disease related factors.

The second qualitative study (Chapter 4) found that adults with IBD described concerns pertaining to underperformance at work and preventing an accident in public as linked to their symptoms of anxiety. Low mood was reported to be associated with a perceived lack of understanding of IBD from others and stigma. Distinct cognitive and behavioural responses were described by participants in each of these domains. Participants in this study stated a desire for psychological support delivered by a professional with specialised knowledge of IBD to evaluate and build their coping strategies.

The third quantitative study (chapter 5) found that unhelpful cognitive, emotional and behavioural responses (assessed at baseline), after adjusting for sociodemographic and disease related factors, were associated with negative adjustment outcomes at baseline (cross sectional) and 3 month follow up.

The final clinical, pilot study found that transdiagnostic cognitive behaviour therapy (TD-CBT) had clinical benefits for adults with IBD who were distressed. Uncontrolled effect sizes were superior to those of a previous RCT.

This series of studies consistently identified unhelpful cognitive, emotional and behavioural responses that are associated with and predictive of negative adjustment outcomes for adults with IBD. Further, TD-CBT was found to be of benefit. These findings provide insight into how psychological interventions should be designed and delivered to be helpful and acceptable for people with IBD and disturbance to mood and quality of life.

ACKNOWLEDGEMENTS

The completion of this research would not have been possible without the co-operation of all the individuals who took part. The biggest thank you has to go to them. I would like to thank the clinical team of the IBD service at King's College hospital for participating in this research and for providing the opportunity to set up the CBT clinic within their service.

I am extremely grateful to Trudie Chalder for her supervision with this thesis from its inception and for her support and helpful comments throughout. I would also like to thank Nicola Fear for her supervision and support.

I would also like to thank the department of Nursing and Midwifery at King's College London for their support with the completion of this thesis.

Finally I would I like to thank my husband Robin for his support and patience whilst I carried out this research.

CONTENTS

APPENDICES

Page No:

LIST OF TABLES

LIST OF FIGURES

Page No:

Chapter 1: Thesis overview

This thesis brings together a series of studies examining the psychological processes associated with negative adjustment outcomes for adults with inflammatory bowel disease (IBD). IBD is a chronic long term condition which poses significant psychosocial adjustment challenges. The overall aim of the studies included in this thesis was to determine empirically the psychological factors associated with anxiety, depression, general psychological distress and poor quality of life for adults with IBD, with a view to suggesting evidence based targets that could be modified though a psychological intervention.

The first stage of this research systematically reviewed the existing literature which addressed psychological factors and their associations with adjustment outcomes in adults with IBD. This review introduces the key features of IBD including its aetiology, symptom presentation, epidemiology, diagnosis, prognosis, and treatment. It then discusses specific features of IBD which can make it a particularly difficult disease to live with and briefly considers previous research evaluating the efficacy of psychological intervention for improving outcomes in this population. Conceptual distinctions between psychological factors and adjustment outcomes are outlined. Following a review of the empirical evidence, this chapter ends with suggestions for future research which forms the rationale for the studies undertaken in this thesis.

The findings of this review identified that although several psychological factors were linked to poor adjustment outcomes, this was based on the findings of a limited number of studies exploring a diverse range of psychological variables with only one study providing any longitudinal data (Jordan et al, 2016). The review concluded that future studies should expand the range of cognitive, emotional and behavioural factors examined in relation to adjustment outcomes to fully capture the experience of living with IBD and employ a prospective design to assess the direction of these associations (Jordan et al, 2016). It was suggested that the findings of qualitative studies could provide some insight into psychological processes worthy of further investigation in quantitative studies. Qualitative findings to date have delivered a detailed description of the burden of living with IBD from the patients' perspective but have not offered any insight into how these experiences linked to anxiety or low mood (Jordan et al, 2016).

A further important limitation identified in the systematic review pertains to previous randomised controlled trials of psychotherapy for improving biopsychosocial outcomes for people with IBD. A Cochrane meta-analysis of randomised controlled trials (RCTs) concluded that there was no evidence that psychological interventions enhanced emotional states, quality of life (QOL) or reduced disease activity in the short term or at 12 months in adults with IBD. A major problem associated with the studies included in this review was that 19 out of 20 studies recruited adult patients without distress at the start. This is likely to have significantly reduced any potential treatment effects as participants generally had good mental health (Timmer et al, 2011).

On the basis of the limitations identified within the current evidence base a mixed methods research approach was adopted in this thesis to further explore the psychological factors associated with negative adjustment outcomes. The logic model illustrated in figure 1. 1 below provides an overview of the studies included in this thesis. The methodological issues specific to each along with the questionnaires and analytical strategies utilised will be described in detail in the appropriate chapters.

A qualitative approach with in-depth semi-structured face to face interviews was employed to 1) investigate the specific situations, thoughts, perceptions, appraisals, beliefs and behaviour that people with IBD described as linked to their symptoms of anxiety and low mood 2) explore the type of psychological help or support people with IBD and elevated symptoms of anxiety and low mood would like as part of routine medical care. A secondary aim was to consider these findings in relation to the knowledge associated with the competencies set for psychological therapists delivering interventions for long term conditions.

Qualitative methods are particularly well placed to elicit rich descriptions and explanations of individual experiences as they do not impose fixed choice answers (Klein et al, 2006). Consequently this approach allowed participants to articulate any idiosyncratic beliefs and behaviour linked to their experience of disturbance to mood (Sofaer, 1999). Qualitative research has been criticised for being subjective and lacking generalisability but it was anticipated that these key

weakness would be addressed by the strengths of the quantitative methods employed in the subsequent studies in this thesis (Dures et al, 2011).

A quantitative approach was therefore adopted to further investigate the cognitive, emotional and behavioural responses associated with negative adjustment outcomes; anxiety, low mood, general psychological distress and poor quality of life. Data on sociodemographic, clinical, and psychological factors and adjustment outcomes were collected at baseline and 3 month follow up. A cross sectional and prospective analysis was carried out in order to assess the relationships between psychological factors assessed at baseline and adjustment outcomes measured at baseline and 3 month follow up.

It was hypothesised that unhelpful beliefs about experiencing and expressing negative emotions (BeS), unhelpful behavioural responses to gastrointestinal symptoms (IBS-BRQ), a lack of acceptance beliefs towards symptoms (CPAQ), avoiding exercise due to a fear it will make symptoms worse (CBSQ: FA), believing symptoms are damaging (CBSQ: D), focusing on symptoms (CBSQ: SF), excessive resting to manage symptoms (CBSQ: AR), all or nothing behaviour (CBSQ: AL) and avoidance of activities due to embarrassment about symptoms and worries about how others will judge symptoms (CBSQ: EA), would be associated with baseline (Time 1) cases of anxiety, depression, psychological distress and poor health related quality of life, when taking sociodemographic, and disease related variables into account. Further, it was anticipated that these cognitive, behavioural and emotional responses would be associated with an increased risk

of being a moderate case of anxiety, depression, general psychological distress and poor health related quality of life at three month follow up in the prospective analysis (Time 2).

Due to a much larger sample size the results from these quantitative analyses were more generalisable to the wider IBD population and potentially confounding sociodemographic and clinical variables were taken into account. The results of the prospective analysis also provided the most robust evidence to date for the direction of the relationship between psychological factors and negative adjustment outcomes. Merging insights from these qualitative and quantitative studies was intended to facilitate a broad understanding of the topic under study (Yardley & Bishop, 2009).

Finally, given the results of previous randomised controlled trials, it was important to evaluate whether a psychological intervention could help those with IBD and clinically significant distress. A pragmatic quantitative approach was chosen and a non-randomised uncontrolled trial design was adopted for investigating the benefits of clinic based CBT for this group. Although this meant that there were limitations to the conclusion that could be drawn on the basis of this study's findings, it gave a preliminary indication of any potential benefits. Further, uncontrolled effect sizes could be calculated and considered in relation to those of a previous RCT. It was hypothesised that levels of anxiety and low mood would reduce after the clinic based CBT and that the uncontrolled effect sizes would be superior to the effect sizes in the comparison RCT.

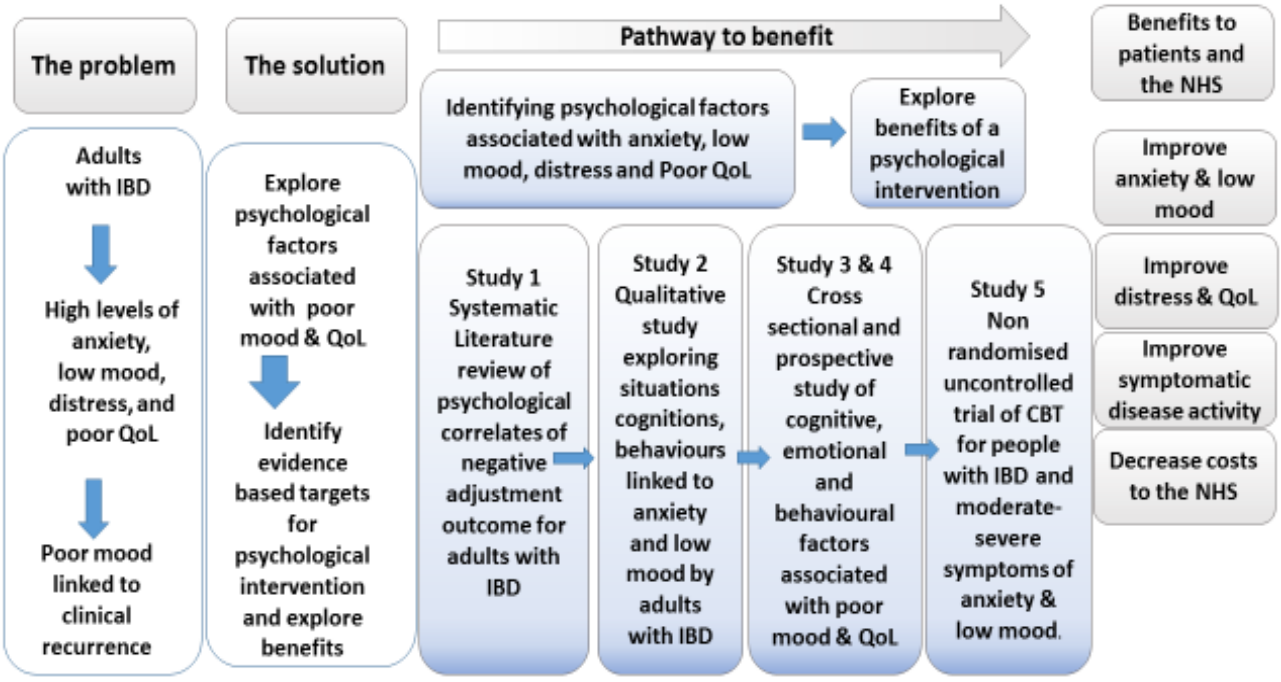
The final chapter of this thesis brings together the overall findings of this collection of studies and considers the evidence for:

1) psychological factors and their associations with negative adjustment outcomes for adults with IBD;

2) the benefits of a psychological intervention for improving outcomes in this population and

3) the implications for healthcare and further research.

Figure 1.1: Logic model - Improving mood and quality of life for adults with IBD: summary of studies



Chapter 2: A systematic review of the psychological correlates of adjustment outcomes in adults with inflammatory bowel disease.

This chapter has been published in clinical psychological review (full reference below). Presented here is the authors accepted manuscript version of the paper.

Statement of contributions: I generated the idea for the scope of this review which in conjunction with TC was developed into a study protocol. I planned and executed the search strategy, identified & reviewed & selected studies to be included, extracted the data and planned and carried out the data synthesis and write up of this review. To ensure rigour in this process JS reviewed a randomly selected range of excluded studies to check for accuracy and independently extracted data. Both TC & NF were involved in developing the analysis strategy and drafting and revising the paper.

Reference; Jordan C, Sin J, Fear N.T, Chalder, T, (2016). A systematic review of the psychological correlates of adjustment outcomes in adults with inflammatory bowel disease. Clinical Psychology Review. Jul; 47: pp 28-40

2.1: Hi-lights

- Emotion focused coping strategies are associated with worse adjustment outcomes in IBD.
- Some evidence for an association between other psychological factors and adjustment outcomes.
- Suggested intervention targets; coping strategies, perceived stress, IBD related cognitions.

Abstract

Inflammatory bowel disease (IBD) is a chronic long term condition which poses significant psychosocial adjustment challenges. The purpose of this review was to systematically identify psychological factors related to adjustment in adults with IBD with the aim of suggesting evidence based targets that may be modifiable though psychological intervention. Twenty five studies met inclusion criteria and were included in the systematic review and a narrative synthesis was conducted. A wide range of psychological variables were addressed covering six broad categories; personality traits, interpersonal traits, stress and coping, emotions and emotional control, IBD related cognitions and non IBD related cognitions. The most consistent relationship was found between certain emotion focused coping strategies and worse adjustment outcomes in IBD. Some evidence also hi-lighted a relationship between personality traits (such as neuroticism) perceived stress, emotions and emotional control (such as alexithymia) and IBD related cognitions (such as illness perceptions) and negative adjustment outcomes. The results of this review suggest that interventions to improve adjustment in IBD may benefit from a focus on coping strategies, perceived stress and IBD related cognitions.

2.2: Introduction

The two main types of inflammatory bowel disease (IBD) are Crohn's disease (CD) and ulcerative colitis (UC). Both of these conditions affect men and women equally, with diagnosis usually occurring between the ages of 10 and 40. The incidence and prevalence of IBD is increasing worldwide. The highest reported prevalence values for IBD are in Europe (UC, 505 per 100,000 persons; CD, 322 per 100,000 persons) and North America (UC, 249 per 100,000 persons; CD, 319 per 100,000 persons) (Molodecky et al, 2012). In Crohn's disease any part of the intestines can become intermittently inflamed, whereas in ulcerative colitis this is usually restricted to the colon. This produces a range of unpleasant and disabling symptoms including diarrhoea, fatigue, weight loss and pain in the abdomen. The course of IBD is idiosyncratic and unpredictable. Its exact aetiology is unknown and there is currently no certain cure. The current standard of care in IBD treatment is aimed at managing the inflammatory response during flare episodes and maintaining remission with an emphasis on adhering to a regular medication regime. In severe cases surgery may be required to remove part of or the entire large bowel, usually resulting in an ileostomy (Kiebles et al, 2010).

IBD poses numerous challenges for both physical and psychosocial functioning. Adults with IBD experience unpleasant and unpredictable symptoms and aggressive treatment regimes. In addition they face psychosocial consequences including disruptions to their life goals, employment, and social and leisure activities (Kemp et al 2012). Psychosocial difficulties are common in IBD when compared to both non-clinical (Kovac et al, 2007) and other chronic disease

populations (Fillpovic et al, 2007). The empirical evidence demonstrates the life time prevalence rates of anxiety and depression to be as high as 35.8% (Walker et al, 2008). The presence of mood disturbance has also been established as being a risk factor for earlier and more active disease (Mittermaier et al, 2004, Graff et al, 2006).

Psychosocial adjustment in adults with IBD can be influenced by disease and socio demographic factors such as remission status, pain severity, relapses per year, treatment, extra intestinal manifestations and gender (Petrak et al, 2001, Goodhand et al, 2012, Moreno-Jimenez et al, 2007). However, these factors are variably associated with adjustment and are often only moderate predictors (Mussell et al, 2004, Turnball et al, 1995). Research demonstrates that psychological factors are often better predictors of individual differences in adjustment and in contrast to clinical or disease factors are potentially adaptable through psychological interventions (Kiebles et al, 2010 Mussell et al, 2004, Moreno-Jimenez et al, 2007, Dorrian et al, 2009).

A meta-analysis conducted by Timmer and colleagues (2011) concluded that there was no evidence that psychological interventions in general enhance emotional states, HRQOL and disease activity for adults with IBD. However, there are limitations to this review. The authors combined stress management, psychodynamic psychotherapy and cognitive behaviour therapy (CBT) studies as “psychotherapy” in the meta–analysis, therefore any differential efficacy between these theoretically distinct approaches could not be evaluated. When considered

independently, a more recent review found promising evidence that CBT improved mental health in patients with IBD, both immediately following the intervention and at 6 months follow up (Knowles et al, 2013).

In addition both reviews have included studies where the majority of participants have sub clinical levels of anxiety and depression which is likely to have reduced treatment effects. There is also a lack of information given about which psychological factors were targeted within interventions and how these factors were related to adjustment outcomes. Further work identifying the psychological factors that influence adjustment outcomes is warranted in order to identify sub groups of patients most likely to benefit from targeted psychological therapy (Timmer et al, 2011).

The purpose of this current review is to systematically review existing literature which addresses psychological factors that may be associated with, predict or explain adjustment outcomes in adults with IBD. The aims are to: a) Identify what types of psychological factors have been studied to date; b) Establish which psychological variables might serve to explain or predict differences in how well people adjust to living with IBD; c) Gain an overview of the strength of evidence for relationships between psychological variables and adjustment outcomes in IBD; d) Identify common methodological weaknesses in the research, gaps within the literature, and directions for future research.

For the purposes of this review it was necessary to make a conceptual distinction

between factors potentially involved in predicting or explaining positive or negative adjustment outcomes and the outcomes themselves. Thus, within this review the term psychological factors is used to conceptualize potentially modifiable factors relating to an individual's beliefs, attitudes, perceptions, thoughts and behaviours that it would be possible to address in a psychological intervention. Although personality traits such as neuroticism and interpersonal attachment style are not usually considered modifiable targets for psychological intervention, the effect of these characteristics on cognitions and behaviour often are. These factors are therefore included in this review. The term *adjustment outcomes* pertains to indicators of positive or negative psychosocial adjustment such as psychological or emotional wellbeing, social and role functioning, quality of life (QOL) and self- reported perceptions of health and well-being. A reliable overview of this field will allow clinicians involved in delivering psychological interventions to increase their understanding of the factors linked to adjustment in IBD, so that these could be targeted in interventions.

Although there have been review papers which have summarised the psychosocial issues associated with IBD (e.g. Sajadinejad et al, 2012, Triantafillidis et al, 2013, Sainsbury et al, 2006), these have not been systematic, a systematic review of this research is therefore timely.

2.3: Method

Search strategy and selection criteria

A search strategy was registered with the International Prospective Register of systematic reviews (Prospero: ID CRD42014007435). The systematic review protocol and data extraction forms were designed in accordance with the preferred reporting items for systematic reviews and meta analyses (Moher et al, 2009). Electronic databases (Medline, Embase, Web of Science, Cinahl and psychinfo) were systematically searched for studies published from inception to May 2015, which examined psychological factors relating to adjustment outcomes in IBD. Search terms were customised to each database and involved combining key word searches for a list of adjustment terms (e.g. 'psychosocial adjustment, depression, quality of life), and terms such as 'determin$', 'predict$, correlat$, 'correlat$, and the term 'Inflammatory bowel disease' 'Crohn's disease' and 'ulcerative colitis' (Appendix 1).

Inclusion and exclusion criteria

Studies were included if they met the following criteria: (1) Published empirical quantitative research reports that examined relationships between psychological factors and adjustment outcomes in people over the age of 18 years with IBD; (2) Reported results for IBD participants separately from other conditions.

Studies were excluded if they (1) used qualitative, case report, expert opinion or consensus statement; (2) did not use published or appropriate and replicable multi- item measures to assess both psychological factors and adjustment

outcomes; (3) did not examine the relationship between psychological factors and adjustment outcomes for people with IBD. Uncertainties concerning whether a study met inclusion criteria were resolved through discussion between the authors.

Data Extraction

The database searches and study selection were undertaken by two people. The titles and abstracts were reviewed by one author (CJ). To enhance rigour 10% of all titles discounted at this stage and chosen at random, were independently reviewed by a second author (JS), and agreement was reached in all cases. The full texts were then screened by CJ and all ineligible papers excluded. Information relevant to the research question was systematically extracted and tabulated in order to aid comparison and synthesis of the studies. Extracted data comprised publication data, country of origin, study design and data analysis methodology, sample characteristics, relevant measures, main findings and aspects of methodological quality. The extraction process was completed independently by two of the authors, CJ and JS, and any disagreements resolved through discussion of the study with TC. Where only abstracts were available, or insufficient information was reported, authors were contacted via email. Only one paper was excluded due to insufficient information being reported and the author remaining un-contactable (fig 2. 1).

Data Synthesis

The broad and multifaceted nature of the research question and the

heterogeneity of the included studies precluded meta-analysis. Therefore, a narrative synthesis was conducted guided by the methods described by the Centre of Review and Dissemination, 2009. Psychological factors influencing adjustment were grouped into conceptually and thematically related constructs (e.g. illness perceptions, coping strategies).

Elements of study quality were also assessed. A quality scoring methodology was devised based on a quality assessment tool which was applicable for both cross sectional and longitudinal designs. This had been used in a previously published systematic review of psychological correlates of Rheumatoid Arthritis (Matcham et al, 2015). The quality score out of 7 was calculated based on the following criteria: whether the psychological factor was measured using a validated tool; Yes (score 1) No (score 0); whether the adjustment outcome were measured using a validated tool; Yes (score 1) No (score 0); whether the recruitment strategy was random or consecutive; Yes (score 1) No (score 0); whether participants were recruited from multiple centres (representing multiple locations not just multiple centres within the same city, for example); Yes (score 1) No (score 0); whether eligibility criteria were specified; Yes (score 1) No (score 0); whether participation rate was greater than 75%; Yes (score 1) No (score 0); whether the study reported it was adequately powered; Yes (score 1) No (score 0). Where studies did not report anything for a particular eligibility indicator, they were allocated to the no category. Final quality scores, together with the information used in their calculation, are shown in table 2.1.

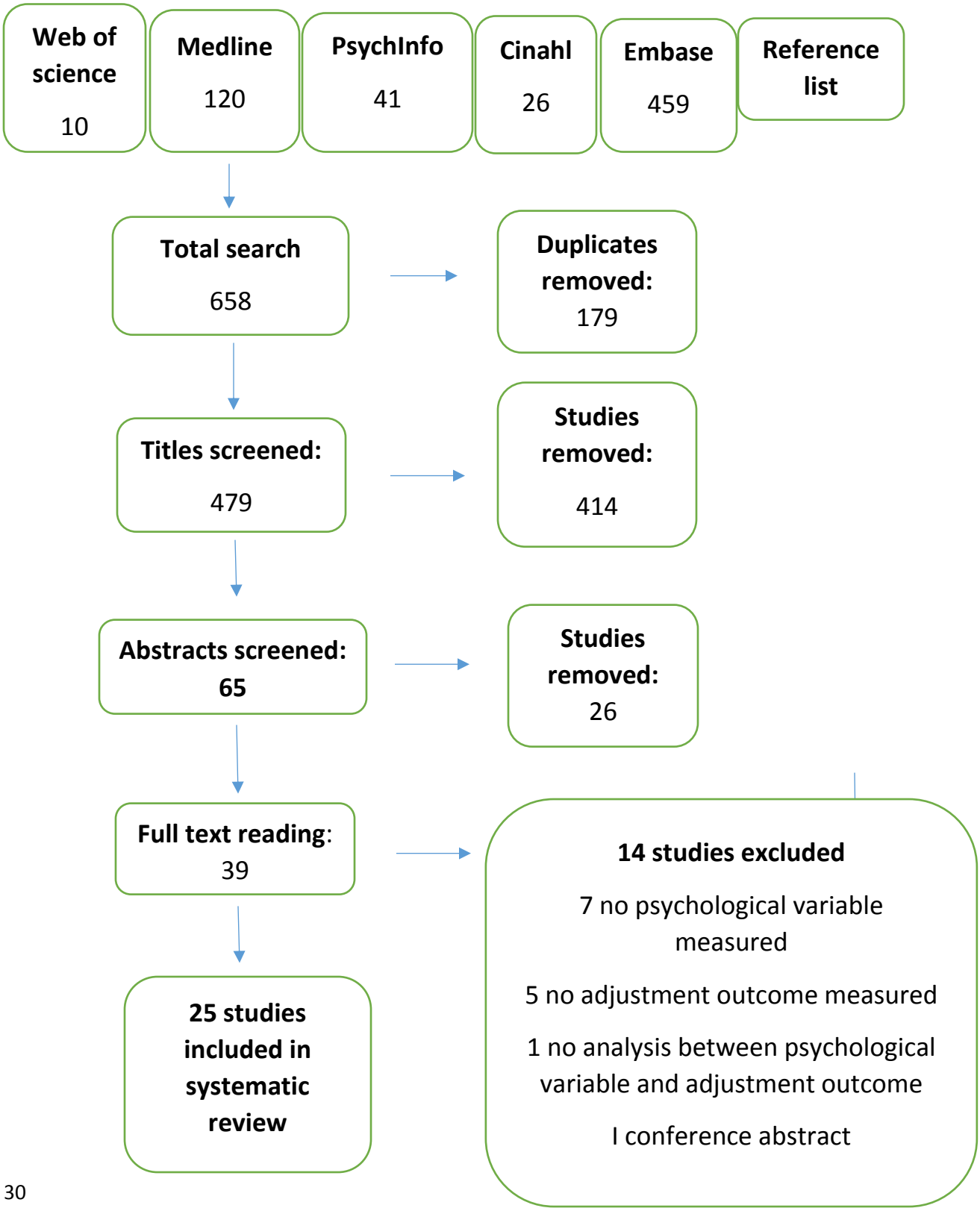
2.4: Results of the systematic search and overview of the included studies

The literature search yielded 658 relevant articles (fig. 2.1). Removal of duplicates, title and abstract screening left 39 for full text screening. Fourteen of these did not meet our eligibility criteria. The most common reason for exclusion was not examining the relationship between psychological factors and adjustment outcomes for adults with IBD. Twenty five studies were deemed eligible for inclusion in the narrative synthesis.

Table 2.1 presents the 25 studies included in the review. All but one study was cross sectional in design (N=24). Self-report questionnaires were utilised for all the psychological factors and adjustment outcomes. Results were typically correlations or regression analyses. The majority of sample sizes were between 50 and 150. However three had less than 50 (Crane et al 2004, Turnball et al, 1995, Keibles et al, 2010) and one more than 1000 (Petrak et al, 2001). Generally samples included more women than men. The mean age of participants typically fell between 35 and 45.

In all studies participants had a diagnosis of IBD which had been assessed by a gastroenterologist. Fourteen studies reported mean time since diagnosis for their sample. The majority used samples where the patients had been diagnosed on average between 5 and 10 years previously (N=12). A few samples had a mean diagnosis of less than 5 years.

Fig. 2.1: Flow chart of the selection of relevant studies.



Twelve studies reported mean levels of symptomatic disease activity. The majority identified that between 30-40% of their sample was experiencing symptomatic disease activity at the time of the study (N=10). A few found less than 20% of their sample as having symptomatic disease activity. Only one study assessed the level of disease activity objectively through endoscopy and faecal calprotectin analysis (Goodhand et al, 2012). All other studies reported symptomatic disease activity based on self- report symptom scores. In addition, three studies reported the amount of relapses participants had in the past year (Moreno-Jiménez et al, 2007, Boye et al, 2008, Inglesias et al, 2012).The most frequent setting for patient recruitment was outpatient clinics.

The included studies examined a range of adjustment outcomes. Quality of life (QOL) was the most common outcome of interest, however depression, anxiety, psychological distress and perceptions of disability were also studied. Only three studies reported findings separately for ulcerative colitis and Crohn's disease (Boye et al, 2008, Goodhand et al, 2012, Tabibian et al, 2015). All other studies, on finding no significant differences performed their statistical analysis on the group as a whole.

Identified psychological variable

A summary of the psychological variables identified and total sample size examining each variable is shown in table 2.2. In total 18 different psychological variables were examined, which were categorised into six broad categories. Personality traits and interpersonal traits, stress and coping, emotion and

emotional processing, IBD related cognitions and non IBD related cognitions. The remainder of the results section summarises and synthesises findings regarding the relationships between psychological factors (grouped into thematically or conceptually-related categories) and adjustment outcomes.

Table 2.1: Studies included in systematic review.

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Boyle et al, 2008	Norway and Germany N=109 (54 UC, 55 CD) 70% female Mean age: 38.2	Multi centre Selected sample Eligibility criteria specified. Participation rate < 75% Not adequately powered	Cross sectional Multiple linear regression models.	Quality of life: SF-36	Aggression & hostility (BPA) Neuroticism (EPQ) Social desirability/ conventionality (EPQ-L) Toronto Alexithymia Scale (TAS) Locus of Control (MLOCS)	Neuroticism, powerful other locus of control, chance locus of control, Agg/hostility (CD only), age and symptomatic disease activity associated with reduced quality of life. Internal locus of control associated with better quality of life.	4/7
Crane et al, 2004	UK N=33 64% female Mean age: 42	Single centre Convenience sample Eligibility criteria specified. Participation rate < 75% Not adequately powered	Cross sectional Correlation	Anxiety and depression (HADS)	Coping (VPMI)	Emotion focused coping associated with depression.	3/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Caplan et al, 2014	Canada N=193 (62%UC) 56.6% female Mean age 46.3	Single centre Convenience sample Eligibility criteria not specified. Participation rate< 75% Not adequately powered.	Cross sectional Multiple regression	Quality of life (IBDQ)	Attachment style (ECR-R)	Anxious attachment associated with reduced quality of life.	2/7
Dorrian et al, 2009	Ireland & Scotland *N=80* 54% female Mean age :40 Mean disease duration: 10.9 years	Single centre Consecutive sampling Eligibility criteria specified. Participation rate < 75% Adequately powered.	Cross sectional Hierarchical regression analyses	Anxiety and depression (HADS) Quality of life (IBDQ) Functional Independence (FLP)	Illness Perceptions (IPQ-R)	Illness perceptions (consequences), emotion focused coping strategies, symptomatic disease activity associated with reduced quality of life. Coping did not significantly add to predicting adjustment once illness perceptions were controlled for	5/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Faust et al, 2012	USA. N=80 51% female Mean age: 37.2	Single centre Convenience sample Eligibility criteria not specified. Participation rate < 75% Not Adequately powered	Cross sectional Hierarchical regression	Anxiety and Depression (HADS) Quality of life (SIBDQ).	Coping (COPE questionnaire) Social Constraint Questionnaire (SCQ)	No association between coping and anxiety, depression, reduced quality of life. Social constraint associated with reduced quality of life.	2/7
Flett et al, 2011.	Canada N=51 (27CD 24 UC) 61% female mean age: 37.7 disease duration: 9.29 years	Multi centre Convenience sample Eligibility criteria specified. Participation rate> 75% Not adequately powered.	Cross sectional Bivariate correlation	The Psychosocial Impact subscale of the Sickness Impact Profile (SIP136)	Perfectionism (MPS) (PSPS) Neuroticism (NEO-PI-R)	Perfectionism and neuroticism associated with reduced quality of life.	5/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Goodhand et al, 2012	London UK. N=204 U/C =103 49% female Mean age :42) CD = 101 57% female Mean age: 43	Single centre Selected sample Eligibility criteria specified. Participation rate < 75% Not adequately powered.	Cross sectional two-step Multiple linear regression models	Anxiety and depression (HADS)	General Perceived Stress Questionnaire (G-PSQ)	In UC, anxiety scores were associated with perceived stress and a new diagnosis of IBD; depression was associated with stress, inpatient status, and active disease. In CD, anxiety was associated with per-ceived stress, abdominal pain, and lower socioeconomic status, and depression with perceived stress and increasing age.	3/7
Iglesias-rey et al 2012	Spain N= 484 UC=292 49% female Mean age: 47 CD= 192 female 58%. Mean age: 38	Single centre Convenience sample. Eligibility criteria specified. Participation rate < 75% Not adequately powered.	Cross sectional Multiple linear regression and logistic regression	Anxiety and depression (HADS) Quality of life (IBDQ) (SF-36)	Alexithymia scale (TAS-26)	Alexithymia, age and symptomatic disease activity associated with reduced quality of life.	4/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Kiebles et al, 2010	USA N=38 63% women Mean age : 36.2 Disease duration: 10 years	Single centre Convenience sample. Eligibility criteria specified. Participation rate < 75% Not adequately powered.	Cross sectional Pearson's product moment correlation coefficient	Quality of life : IBDQ Emotional distress(BSI)	Coping(BRIEF COPE) Perceived Stress (PSQ) Illness Perceptions (IPQ-R) Acceptance (DDAQ)	Emotion focused coping associated with reduced quality of life. Symptom tolerance, activity engagement associated with better quality of life.	3/7
Kinash et al, 1993	Canada N=150 (*88 UC 62 CD)* 48% female 62% aged 25-44	Single centre Convenience sample Eligibility criteria specified. Participation rate> 75% Not adequately powered.	Cross sectional Bivariate correlation	Depression (BDI)	Coping (JCS)	Emotion focused coping associated with depression.	4/7
Lui et al, 2013	China N=80 CD 25% female	Single Centre Convenience sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional Multiple linear regression analysis	Quality of life IBDQ)	Neuroticism (EPI)	Neuroticism associated with reduced quality of life.	3/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Maunder et al, 2005	Canada **T1** N=146 (44.5% female, Mean age 42, Mean Disease duration 14.6 years) **T2** N=99 (45.4% female, Mean age 45 Mean Disease duration 16.4 years)	Single centre Convenience sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Longitudinal correlation	Depression (CES-D)	Attachment style (ECR-R)	Avoidant attachment, anxious attachment associated with depression.	3/7
Moreno-Jimenez et al, 2007	SPAIN N=120 Female 47% Mean age 43 Disease duration: 8.48 years.	Single centre Convenience sample	Cross sectional Hierarchical regression analyses	Quality of life (IBDQ)	Self-esteem (RSE) Neuroticism (EPI)	Neuroticism, female, treatment, number of relapses per year associated with reduced quality of life. Higher self-esteem associated with increased quality of life.	4/7
Munson et al, 2009.	USA N=260 6.2% female Mean age: 63	Multi centre Convenience sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional Sequential multivariate linear regression	Quality of life (SIBDQ)	Skills, knowledge confidence. (PAM) (PEI)	Increased skills and confidence associated with increased quality of life.	4/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Mussell et al, 2004	Germany N=72 58% female Disease duration: 11.7yrs	Single centre . Consecutive sample Eligibility criteria specified. Participation rate> 75% Not adequately powered.	Cross sectional Multiple regression analysis	Quality of life (RFIPC) Psychological distress (SCL-90-R) Somatic complaints (FCL)	Coping (FQ) Illness and health locus of control ((MHLC)	Emotion focused coping, female, symptomatic disease activity associated with reduced quality of life. Locus of control not associated with quality of life.	5/7
Olbrisch, et al, 1982	USA N=143 55% female Mean age :39 Disease duration: 10 years.	Single centre Convenience sample Eligibility criteria not specified. Participation rate< 75% Not adequately powered.	Cross sectional Multiple regression	Psychological adjustment: experience scale	Private self-consciousness (SCS)	Private self-consciousness associated with psychological distress.	2/7
Petrak et al, 2001	Germany N=1322 52% female Mean age 39.6	Multicentre Consecutive sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional Multiple, non-linear regression analysis	Quality of life : Sf-36	Coping (FKV-LIS) Hopelessness (H-RB-Skala)	Emotion focused coping, hopelessness, older age, symptomatic disease activity, associated with reduced quality of life.	5/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Sajadinejad et al, 2012	Iran N=58 UC 100% female Mean age 35	Single centre Convenience sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional ANOVA test	Quality of life : WHO Quality of Life questionnaire	Type D personality (DS14), neuroticism (NEO‐FFI)	Type D personality, neuroticism associated with reduced quality of life.	3/7
Seres et al 2008.	Hungary N=66 UC 70% female	Single centre Convenience sample Eligibility criteria specified. Participation rate> 75% Not adequately powered.	Cross sectional Analysis of covariance	Quality of life: Irritable Bowel Syndrome Quality of Life Questionnaire (IBSQOL)	Coping (CSQ)	Emotion focused coping associated with reduced quality of life.	4/7
Sewitch et al, 2001	Canada N=200 (167 CD, 37 UC) 60% female Mean age :38 Mean Disease duration: 8.1 years	Single centre Convenience sample Eligibility criteria specified. Participation rate> 75% Not adequately powered.	Cross sectional Multiple linear regression	Psychological distress (Symptom Checklist-90R)	Perceptions of stress (PSQ) Perceptions of social support (SSQ-6)	Perceptions of stress, symptomatic disease activity, less time since diagnosis associated with increased psychological distress. High satisfaction with social support mitigates impact of stress on adjustment outcomes.	4/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Smolen et al, 1993.	USA N=46 (33 CD, 13 UC) 74% female Mean age: 44.2	Single centre Convenience sample Eligibility criteria specified. Participation rate> 75% Not adequately powered.	Cross sectional Stepwise regression analysis	Quality of life : Medical Outcome Study Short-Form Health survey (SF-36)	Coping (JCS)	Emotion focused coping associated with reduced quality of life. Optimistic coping associated with increased quality of life.	4/7
Tabibian et al, 2015	USA N=136 (57% CD , 43% UC) 82% female Mean age: 32.5	Single centre Convenience sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional Multivariate linear regression	Quality of life (IBDQ)	Perceived Stress Scale (PSS-10)	Perceived stress, number of relapses per year, female, being older associated with reduced quality of life.	3/7
Taft et al,	USA N=211 (156 CD, 55 UC) 77% female 69% were under age 46 43% diagnosed within the last 5 years	Multicentre Convenience sample Eligibility criteria not specified. Participation rate< 75% Not adequately powered.	Cross sectional Hierarchical regression analyses	Psychological distress(BSI-18) Quality of life (IBDQ)	Perceived Stigma (PSS-IBS)	Perceived stigma associated with increased psychological distress and reduced quality of life.	3/7

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Turnball et al, 1995.	Canada N=22 (16CD 6 UC) 64% female Mean age: 32 Mean age of onset: 26 years	Single centre. Consecutive sample. Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional Regression analysis	Sickness Impact Profile (SIP) The Symptom Checklist-90-R (SCL) Quality of life (IBDQ)	Coping (SCS)	Coping, disease type, gender, age of onset not associated with quality of life.	4/7
Verissimo et al, 1998	Portugal N=74 65% female Mean age:38.1 Disease duration: 10 years	Single centre Convenience sample Eligibility criteria specified. Participation rate< 75% Not adequately powered.	Cross sectional Hierarchical, stepwise multiple regression analysis	Quality of life (IBDQ)	Alexithymia (TAS) The Emotional Expression and Control (EEC)	Alexithymia, education, socioeconomic index associated with reduced quality of life. Higher emotional control associated with increased quality of life.	3/7

Personality traits

A key theme in the adjustment literature is the importance of personality factors in mediating the psychosocial impact of chronic physical illness. Over the last decade several studies have investigated the influence of personality variables such as neuroticism and perfectionism on adjustment outcomes in IBD. Each of these constructs is hypothesised to play a role in psychosocial wellbeing through its impact on the way an individual reacts to the diagnosis of IBD, its symptoms or other stressful events. Neuroticism, for example, is characterised by emotional instability and a tendency to interpret situations as threatening. Individuals who score high for neuroticism may, therefore, be predisposed to making extreme attributions in relation to their IBD and its symptoms and experiencing intense emotional reactions as a result (Eysenck et al, 1976). Perfectionists tend to strive relentlessly towards unobtainable goals, valuing their self-worth in terms of productivity and accomplishments. Individuals high in this trait may therefore be more prone to evaluating themselves negatively in-light of the disruption caused by IBD to their life goals (Flett et al, 2002).

Five studies have investigated the link between three personality traits and adjustment outcomes; neuroticism, perfectionism and type D personality (Flett et al, 2011, Boye et al, 2008, Moreno-Jiménez et al 2007 Liu et al, 2013, Sajadinejad et al, 2012) (Table 2.2). At a cross sectional bivariate level, preliminary evidence (1/1) suggests a significant relationship between other ($r=.50$ $p< 0.001$), and socially prescribed ($r=.59$ $p<0.001$) perfectionism and reduced psychosocial functioning. Whether this relationship would be sustained at a multivariate level is yet to be tested (Flett et al, 2011). This study

has a high quality score of 5 as shown in table 2.1.

At a multivariable level after adjusting for socio demographic and clinical factors, 100% of results (4/4) show neuroticism (Boye et al, 2008, Moreno-Jiménez et al 2007 Liu et al, 2013, Sajadinejad et al, 2012) and type D personality (1/1) (β -0.053 p<0.001 Sajadinejad et al, 2012), to be significantly associated with a reduced quality of life. Further, neuroticism was specifically associated with worse emotional and social functioning, and with reduced vitality (Boye et al, 2008, Moreno-Jiménez et al 2007). These studies have quality scores of between 3-4 (table 2.1).

The strength of association between neuroticism (p<0.001) and QOL was largely consistent and equal to clinical variables (P<0.001) across the five studies. Even those studies with small sample sizes found strong associations between neuroticism and QOL (e.g. N=58 β .49 P<0.001, Sajadinejad et al, 2012). The unique variance explained by neuroticism was not given in any of these studies.

Interpersonal traits

Two studies examined the role of attachment style on adjustment outcomes in IBD. Attachment style is a psychological concept that attempts to describe the dynamics of interpersonal relationships between humans. It addresses how individuals respond within relationships when hurt or perceiving a threat. It is conceptualized as secure or insecure, in the form of avoidant or anxious–ambivalent attachment (Waters et al, 2005). At a multivariate level, after controlling for age and recruitment phase, greater anxious attachment (β = 0.29, P = 0.002) was significantly associated with worse QOL (Caplan et al,

2014). Attachment avoidance and attachment anxiety also showed significant bivariate associations with depression at baseline and follow up in one longitudinal study (Maunder et al, 2005).However these studies have a low quality score of 2 and 3 respectively.

Stress and coping

Psychological stress has long been reported anecdotally to increase symptomatic disease activity in IBD. Recent empirical advances have provided some support for this and proposed that stress may increase gut motility and fluid secretion (Mawdsley et al, 2005). According to the stress coping model of Lazarus and Folkman (1984), a dominant paradigm in the field of psychosocial adjustment to chronic illness, the experience of stress in response to difficulties is influenced by the individual's evaluations and appraisals of the stressor and the coping strategies they use to manage it. The following section deals first with the appraisal aspect of the model and then the coping aspects.

Perceptions of stress

As this review is concerned with modifiable psychological factors, we did not examine studies that simply investigated the frequency of life events. Included studies which investigated stress had to judge the subjective, perceived degree of stress reported by the participant.

Four studies examined the role of perceived stress on adjustment outcomes, all cross sectional in design (Kiebles et al, 2010, Goodhand et al, 2012, Sewitch et al, 2001,Tabibian et al, 2015) (table 2.2). At a multivariate level, 100 % of results (4/4) found a statistically significant relationship between perceived

stress and a reduced quality of life, (p=0.01) increased psychological distress(r=0.04 *P* = 0.03), anxiety (β 0.1 P<0.01) and depression (β 0.15 P<0.01). Significant covariates across the majority of studies included symptomatic disease activity (r= 0.10 P = 0.02) and having a newer diagnosis (r= -0.71 P= 0.01). A further 50% of results (2/4) found that being female (p = 0.0015) and older age (β 0.05 P=0.001) were additional independent correlates of depression in CD (Goodhand et al, 2012, Tabibian et al, 2015). Examination of study quality (table 2.1) demonstrated that the small number of studies in this category were of low-moderate quality with scores between 3-4.

In addition, there was some preliminary evidence that the relationship between psychological distress and perceived stress changed depending on the level of satisfaction with social support (r= –0.014 *P* = 0.02).

Coping

Coping strategies refer to the specific efforts, both behavioural and psychological, that people employ to master, tolerate, reduce, or minimize stressful events (Folkman et al, 1991). Historically coping strategies have been measured and categorised in a multitude of ways, however most coping theories broadly classify coping attempts as either emotion focused or problem focused strategies (e.g. Lazarus et al 1985).

Ten studies considered the relationship between coping strategies and adjustment outcomes, all cross sectional in design (Table 2.2). At multivariate level after taking sociodemographic and disease variables into consideration, the results of five out of seven studies show a statistically significant

relationship between emotion focused coping strategies and reduced quality of life, psychological distress, anxiety and depression (Mussell et al, 2004, Petrak et al, 2001, Smolen et al, 1993, Seres at al, 2008, Dorian et al, 2009).

There are some differences between studies in the reported amount of variance explained by coping strategies. The largest study in this category with a sample size of 1322 found that emotion focused coping explained 16% of the variance in QOL. In addition, diagnosis showed a significant influence on this outcome explaining 9% of the variance (Petrak et al, 2001). The results of the majority of studies reported similar findings with emotion focused coping explaining a larger proportion of variance in adjustment outcomes than disease related or demographic characteristics. In contrast, in a series of hierarchical regression models coping did not significantly add to predicting adjustment once illness perceptions were controlled for (3% of the variance in psychological distress) (Dorrian et al, 2009). One possible explanation for this weaker association may be the choice of a generic list of coping strategies to assess coping with IBD. The COPE is designed for use in a variety of situations and may omit some important disease-specific coping strategies. A coping list tailored to the specific tasks associated with IBD may be more appropriate and may produce different results (Dorrian et al, 2009). These studies were all of moderate to high quality with scores ranging between 4-5.

No statistically significant relationships between coping, disease type, age of onset, gender, symptomatic disease activity, and quality of life were found in 2 studies with quality scores of 2-3 (Turnball et al, 1995, Faust et al, 2012).

In contrast, the more adaptive emotion focused strategy of optimistic coping e.g. thinking positively, related to a better quality of life (β 11.7 P=0.01) in one study (Smolen et al, 1993). Further, problem focused coping was linked to a reduced quality of life. However, this relationship was solely apparent during an active phase of the disease (β 0.02 P<0.00) (Petrak et al, 2001).

Emotion and emotional control

Psychological variables examining aspects of emotions or emotional processing were allocated to this group. These variables include hostile feelings and expressed aggression, emotional control, alexithymia and private self-consciousness. Eight studies examined the associations between these variables and quality of life, all using a cross sectional design.

At a multivariate level, results showed that both alexithymia and private self-consciousness were significantly associated with negative adjustment outcomes. Four studies (4/4), found a significant relationship between alexithymia and reduced social, physical and emotional functioning on both generic and IBD specific measures of quality of life (Moreno-Jiménez et al, 2007, Boye et al, 2008, Iglesias-Rey et al, 2012, Verissimo et al, 1998). The strength of association between alexithymia and QOL was largely consistent across studies with p values ranging from <0.01 to 0.001. In addition Verissimo et al, 1998, performed a hierarchical, stepwise multiple regression analysis and found that alexithymia scores accounted for an additional 12.4% of the variance in predicting quality of life after controlling for socio demographic and disease related factors. The majority of results found this trend with educational levels, gender, socioeconomic index, extra-intestinal

manifestations, current symptomatic disease activity and number of relapses per year being additional independent correlates of negative adjustment outcomes. These studies each have a quality score of 4.

Only one study of poor quality considered the relationship between private self-consciousness and quality of life .The findings suggested a heightened awareness of inner thoughts and feelings was associated with worse QOL, with symptomatic disease activity being a further significant covariate (Olbrisch et al, 1982).

Mixed evidence was found for the role of expressed aggression and hostile feelings in determining adjustment in IBD. Previous research has linked this trait to higher levels of subjective illness, poor health habits and interpersonal conflicts, which may reduce overall quality of life (Boye et al, 2008). At a multivariate level, Boye et al 2008, found expressed aggression and hostility to be significantly associated with reduced generic quality of life in Crohn's disease only (β -1.5 $p<0.02$ Boye et al, 2008). This study had a quality rating of 4. Another study of poor quality (Lui et al, 2013) found no significant relationships between this variable and adjustment outcomes. Symptomatic disease activity was a significant covariate of negative adjustment outcomes in both studies.

In contrast, one study found having higher active control of emotions to be significantly linked to a better quality of life (Verissimo et al, 1998). Emotional control scores (ß = 0.261) contributed an additional 5.6% of the variance over and beyond the contributions of education (ß =–0.073), socioeconomic index

(ß = –0.094), and alexithymia (ß = –0.277) (R2 = 0.206; F [4, 57] = 3.69, p< 0.01) (Verissimo et al, 1998). This study has a quality score of 3.

IBD related cognitions

Seven studies examined adjustment in relation to IBD cognitions. IBD cognitions relate to perceptions or thoughts related to IBD, which may be associated with negative adjustment outcomes**.** The common sense model of illness (leventhal et al, 1984) proposes that when faced with a health threat individuals construct their own representations or perceptions of their illness which then guide their ways of responding, and ultimately their adjustment. For example individuals will hold beliefs about responsibility for health outcomes. They may believe that either they, others or fate will shape the impact of their illness (Mussell et al, 2004). In addition, IBD cognitions can relate to concerns about the impact of the disease or being stigmatised or alienated due to the nature of IBD symptoms (Kiebles et al, 2010).

At a multivariate level, feeling stigmatised (1/1) unsupported and misunderstood (1/1) and believing that IBD will have serious consequences (1/1) were significantly associated with negative adjustment outcomes after controlling for illness severity and demographic variables. Current evidence suggests that perceived stigma accounts for 10%–22% of the variance in health-related quality of life scores, 4%–16% for psychological distress, and 15% of the variance in anxiety and depression (Taft et al, 2009).This study has a quality score of 3. Similar to stigma, perceiving oneself to be misunderstood or alienated from one's social support network when seeking support was significantly associated with reduced quality of life (t–2.23 p=<o.o5) (Faust et al, 2012). Further preliminary evidence suggests that believing that IBD will

have serious consequences explains a greater proportion of variance in psychological distress than demographic or clinical factors (32% as opposed to 23%) (Dorrian et al, 2007).This study has a quality score of 5, one of the highest of any study included in this review.

Conflicting evidence exists for the influence of locus of control on adjustment outcomes in IBD at a multivariate level (Boye et al, 2008, Mussell et al 2004). Only one study found internal locus of control to be significantly associated with a better of quality of life. Whilst a powerful other tendency and chance locus of control was linked to a reduced quality of life (Boye et al, 2008). Quality scores for these studies ranged between 4-5.

At a bivariate level, symptom tolerance and activity engagement have been linked to better adjustment outcomes (kiebles et al, 2010). Whether this relationship would be sustained in multivariate analysis is yet to be tested. Patient's knowledge, skill, and confidence in self-health management has also shown links to positive adjustment outcomes. However the population was comprised entirely of veterans, predominantly older and male, who received care in a limited geographical region (Kentucky and Tennessee, USA), thus these conclusions may not apply to other clinical IBD populations (Munson et al 2009).These studies had quality scores of 3 (kiebles et al 2010) and 4 (Munsun et al, 2009).

Non IBD related cognitions

Two studies examined adjustment in relation to non IBD related cognitions. Non IBD cognitions pertain to global perceptions or thoughts which are not

focused on the experience of having IBD such as global self- esteem and general hopelessness which may be associated with adjustment outcomes.

At a multivariate level both self- esteem and hopelessness are significantly associated with quality of life, albeit in different ways. Self- esteem was most strongly associated with positive social functioning on a health related quality of life measure (β .35 P=<0.001). Associations were also found between this predictor variable and better perceptions of systemic (β 0.20 P=<0.05) and emotional functioning (β .28 P=<0.01) (Moreno-Jiménez et al 2007). This study has a quality score of 4. In contrast, hopelessness was found to be negatively associated with the mental subscale of health related quality of life explaining 4.9% of the variance found in this outcome (Petrak et al, 2001).This study has a quality score of 5.

Table 2.2 Identified psychological variables.

Category	Variable	No of studies examining the variable	Total sample size
Personality traits	Neuroticism	5	418
	Type D	1	58
	Perfectionism	1	51
Interpersonal traits	Attachment	2	339
Stress and coping	Stress	4	578
	Coping	10	1909
Emotions and emotional control	Alexithymia	4	787
	Aggression & hostility	2	189
	Private self -consciousness	1	143
	Active restraint of emotions	1	74
IBD related cognitions	Locus of control	2	181
	Stigma	1	211
	Social constraint	1	80
	Illness perceptions	2	118
	Acceptance	1	38
	Adaptive capacities	1	260
Non IBD related cognitions	Self esteem	1	120
	General hopelessness	1	1322

2.5: Discussion

Summary of main findings

The aim of this review was to identify studies of psychological variables and their associations with adjustment outcomes in adults with IBD. A systematic search of the literature identified several psychological correlates of adjustment which were grouped into six categories; personality traits, interpersonal traits, stress and coping, emotions and emotional control, IBD related cognitions and non IBD related cognitions.

The most studied personality trait is neuroticism. Consistently at a multivariate level results show neuroticism to be significantly associated with negative adjustment outcomes, specifically with reduced emotional functioning (Boye et al, 2008, Moreno-Jiménez et al 2007 Liu et al, 2013, Sajadinejad et al, 2012).Neuroticism shows an equal influence on adjustment outcomes as clinical variables such as relapses per year and type of treatment. Preliminary evidence suggests that Type D personality may have a similar influence on outcomes (Liu et al, 2013). Perfectionism is also unhelpful for adjustment, however whether this relationship would be maintained when taking socio-demographic and disease variables into consideration is currently unknown but warrants further investigation (Flett et al, 2011). Personality variables are likely to be important in understanding the psychological factors that predispose an individual to developing unhelpful cognitive and behavioural responses to IBD.

Attachment style has also been identified as influencing adjustment to IBD (Maunder et al, 2005, Caplan et al, 2014) with links to depression and a

reduced quality of life. Understanding insecure attachment in the context of relationships with health care staff may be useful in promoting, developing and sustaining supportive relationships.

Perceptions of being under stress consistently links to negative adjustment outcomes, demonstrating a similar influence to sociodemographic and disease related factors (Kiebles et al, 2010, Goodhand et al, 2012, Sewitch et al, 2001,Tabibian et al, 2015). Interestingly there is some preliminary evidence that social support mitigates the impact stress has on a person's mental health. Understanding obstacles to engaging in social relationships such having an insecure attachment style may therefore be important in promoting supportive social relationships and ultimately positive adjustment.

Consistently the evidence suggests a significant association between emotion focused coping methods and a reduced quality of life and increased psychological distress at a multivariate level (Cranes et al, 2003, Kiebles et al, 2010, Mussell et al, 2004, Petrak et al, 2001, Smolen et al, 1993, Seres at al, 2008, Dorian et al, 2009, Seres et al 2008, Turnball et al, 1995, Faust et al 2012).

When considering emotions and emotional control, several studies found an association between alexithymia and a reduced quality of life which is significant at a multivariate level (Moreno-Jiménez et al, 2007, Boye et al, 2008, Iglesias-Rey et al, 2012, Verissimo et al, 1998). Alexithymia is defined as a difficulty in identifying and describing emotions which can lead to greater avoidant behaviours and fewer intimate relationships, both of which are likely

to be unhelpful for quality of life (Inglesias-Rey et al, 2012). Contradictory evidence exists for a link between aggression and hostility and quality of life with one finding a relationship (Boye et al, 2008) and one not (Lui et al, 2013). Further, at a multivariate level a heightened awareness of inner thoughts and feelings was linked to a reduced quality of life in one study (Olbrisch et al, 1982), whilst scoring higher for emotional control was associated with improvements in this outcome in another (Verissimo et al, 1998). Clearly further studies are required to elucidate the nature of these relationships. It is possible that extreme emotional responses are unhelpful.

Current evidence suggests that several thoughts and perceptions concerning IBD link to unhelpful adjustment outcomes. At a multivariate level, feeling stigmatised (Taft et al, 2009), socially constrained (Faust et al, 2012), having an emotional representation of the illness and believing that it will have serious consequences (Dorrian et al, 2007) were all significantly associated with psychological distress and a reduced quality of life. In contrast feeling optimistic and confident in one's knowledge and skills to manage health linked to an increased quality of life score, albeit in a specific population of veterans (Munsun et al, 2009). At a bivariate level acceptance towards the symptoms and engagement with valued activities despite them was associated with better emotional and social functioning and reduced psychological distress (Kiebles et al, 2010). However each of these psychological variables has been investigated by only one study. Clearly research in this area is very much in its infancy but the findings suggest further exploration is warranted.

Non IBD related cognitions which appear to be important to adjustment are self- esteem which one study linked to better adjustment (Moreno-Jiménez et al 2007) and hopelessness which showed associations with poorer outcomes (Petrak et al, 2001).

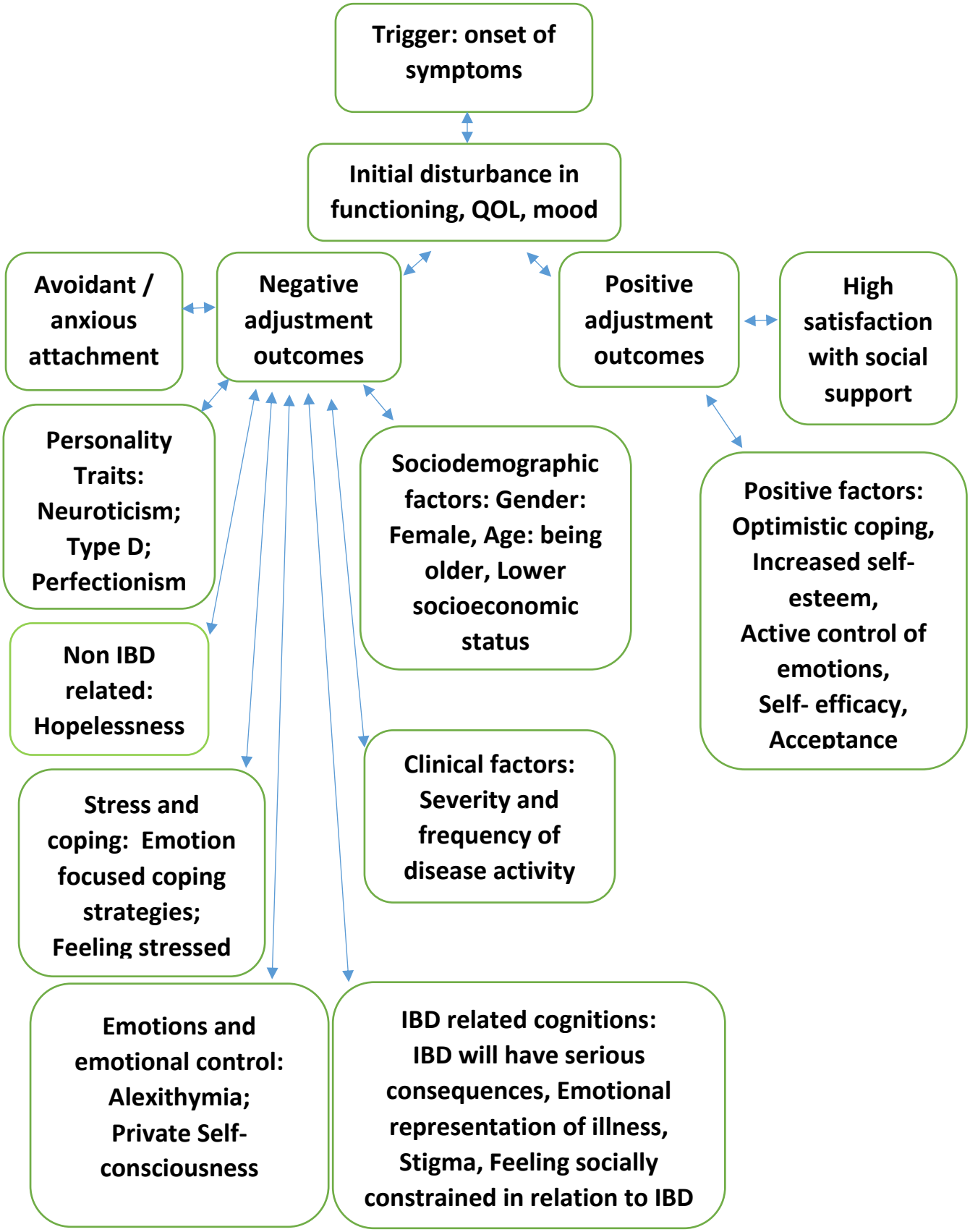
Importantly , the results of our review suggest that even though socio-demographic and disease related factors such as lower socioeconomic status, gender and symptomatic disease activity play an important role in adjustment, psychological variables maintain their significance when controlling for the influence of these factors. Overall, psychological variables consistently link to worse mental health outcomes whether measured as psychological distress or emotional functioning as part of overall quality of life. However, all but one study was cross sectional in design without any element of follow up. The lack of any longitudinal data means that causal relationships between psychological factors and outcomes cannot be established and it is not possible to discern which factors are most important for adjustment in IBD.

Psychological model of understanding adjustment in IBD.

This review sought to systematically review and synthesise the evidence base for the psychological correlates of adjustment and consequently we propose a psychological model of understanding adjustment to IBD (fig 2.2). This is consistent with psychological models of adjustment in other chronic illnesses such as multiple sclerosis and rheumatoid arthritis (Dennison et al 2009, Matcham et al, 2015). The onset of increased psychological distress and a reduction in quality of life and functioning is likely to be associated with a trigger such as the onset of symptoms at the start of a flare episode of IBD.

This disturbance in mood and quality of life might then be maintained over time by disease activity but also by cognitive and behavioural factors. Feeling misunderstood or judged because of the symptoms, might lead to a person feeling low in mood and employing emotion focused coping strategies such as behaviourally disengaging from social activities. The resulting isolation might then maintain or exacerbate the low mood. As depression has been identified as a risk factor for increased disease activity, this might create a vicious circle whereby disease activity leads to a set of thoughts and behaviours which trigger more disease activity and vice versa. Disease activity and psychosocial functioning are therefore likely to be interrelated and bidirectional. In contrast, acceptance and tolerance of symptoms and engaging in meaningful activities, feeling confident in skills and abilities to manage health and employing optimistic coping strategies may help a person to manage or appraise their symptoms of IBD more effectively.

Figure 2.2: Model of psychological factors linked to adjustment in IBD.



Strengths and limitations

A strength of this review is that it was conducted using a rigorous and replicable methodology with abstract screening and data extraction being carried out by independent researchers in order to minimise bias. However, this review has some limitations. Only studies published in peer reviewed journals were considered. The choice of research questions to address in this review meant that a broad range of studies were included. This resulted in a vast variation both between and within psychological categories which precluded meta-analysis, it was, therefore, not possible to formally assess the extent of publication bias in a sensitivity analysis or funnel plot.

The quality of studies included varied but was generally low. All but one study was cross sectional in design. Therefore, there are limited conclusions which can be drawn as to the nature and direction of the relationship between psychological variables and adjustment outcomes.

A wide range of validated measures were used in the studies. Disease related factors (such as current symptoms, relapses in the past year) examined in this review were self-reported in all but one study. It is likely that objective measurements of disease activity through endoscopy and faecal calprotectin analysis give a more robust indication of disease activity as distress may act as a confounder and could potentially lead to inflated reporting of this phenomenon.

Most studies used appropriate statistical methods for analysing data and accounted for the presence of confounding variables during the analysis.

Sample size calculations were absent from all but one of the studies included in this review and most studies had small sample sizes. Small samples could render studies underpowered to detect relationships or mean that positive findings might not generalise to larger or different populations. The majority of studies described demographic sample characteristics such as age, gender and time since diagnosis, although many did not specify details such as socioeconomic status or ethnicity making it difficult in some instances to assess the representativeness of these samples.

All of the studies reported a recruitment strategy. Five studies used consecutive sampling, whilst the rest employed a convenience sample mostly from outpatient clinics although a few additionally recruited through patient organisations. An advantage of this type of sampling is that is less open to selection bias because the participants are likely to be less selected than in randomised controlled trials. In addition, all but three studies stated their inclusion/exclusion criteria (Table 2.1). On review, selection bias was potentially present in two studies whose sample or part of, was recruited primarily to participate in stress reduction intervention studies.

A further consideration is the limited number of studies in this area and narrow range of psychological variables that have been examined. The findings of a recent Meta synthesis of qualitative studies identified fear of embarrassing symptoms occurring in public and avoidance and isolation which results from this as a major theme in the experience of living with IBD (Kemp et al, 2012). Currently no studies have utilised measures that might capture this or have examined the links between this and adjustment outcomes. Our conclusions

relating to psychological factors and adjustment are, therefore, limited by a small quantity of studies focused on a limited range of psychological variables, not all of which are congruent with the experience of people with IBD as identified in the qualitative literature.

Clinical implications of key findings

The findings of this review may have clinical implications. For example, although increased psychological distress and reduced quality of life are commonly reported in IBD patients and has been linked to worse outcomes, it is not consistently measured as an outcome in clinical practice. It may be preferable to include measures of psychosocial adjustment as a routine outcome variable because of its relevance to patients, link to increased disease activity and potential for treatment. Mood and quality of life can be assessed when patients first present to health services and then monitored throughout the course of treatment. Early identification and management could prevent disturbances in mood and quality of life from negatively influencing outcomes for people with IBD.

The results of this review suggest that adjustment is correlated with several psychological factors that could be amenable to change. The application of cognitive behavioural approaches could help identify any unhelpful interactions between symptoms and cognitive and behavioural responses. By using strategies such as testing out thoughts and appraisals about symptoms, a patient might be encouraged to share their experience with a close friend to test the accuracy of their perception that no one will understand. This could lead to an increase in social contact and improve low mood, which may serve

to decrease disease activity. Preliminary evidence from a recent randomised controlled trial suggests that CBT can be useful in improving the quality of life of participants with IBD and poor mental health at 6 months (Mikocka et al, 2015).

Acceptance and tolerance of symptoms and engaging in meaningful activities has been linked to positive adjustment in IBD. The development of this type of psychological flexibility could be encouraged through the application of acceptance and commitment therapy (ACT), which has recently emerged as a third wave within the field of CBT. ACT emphasizes observing thoughts and feelings as they are, without trying to change them, and behaving in ways consistent with valued goals and life directions. This approach has shown some promising results in improving outcomes for people with chronic pain but is yet to be examined in the context of IBD (Davis et al, 2015).

.

A benefit of CBT approaches is that they can be delivered in a variety of ways. Staff at IBD clinics could be trained to deliver low intensity interventions such as working through CBT based self-help manuals with patients. For more severe problems in adjustment high intensity 1:1 CBT may be indicated. Pharmacological treatment of emotional symptoms may also be beneficial in improving outcomes in IBD.

Recommendations for future research

Based on the quality assessment of studies included in this review, we can make some suggestions for future studies of psychological correlates of adjustment in IBD.

Studies should have a prospective design so that causal associations and mediators can be examined. The sample size should be large enough for a well powered statistical analysis and to account for attrition during the course of the study. In order to reduce selection bias and increase generalisability participants should be recruited consecutively from primary or secondary care and from multiple centres.

A model of understanding adjustment in IBD should be based on previous theory and evidence taking into account the findings of qualitative studies focused on living with IBD.
New research should expand the range of social, cognitive and behavioural factors examined in relation to adjustment over time and the choice of measures should be guided by this model. In addition, disease activity should be measured objectively through endoscopy and faecal calprotectin analysis and subjectively via self -report measures. The associations between these bio-psycho-social factors and adjustment can then be examined in multivariate analysis.

2.6: Conclusions

This review has shown that adjustment to IBD is associated with a number of psychological and disease related factors. These relationships have been illustrated in the form of a psychological model of understanding adjustment to IBD. Longitudinal studies are needed in order to understand the nature of adjustment in IBD and any causal relationships with psychosocial factors. The range of psychological factors examined in studies should be expanded to incorporate the themes identified as representing the experience of living with

IBD as identified in qualitative studies. Individuals with IBD are likely to benefit from psychological and pharmacological interventions which target these factors.

2.7: Relevant research published since completion of this review

Review update

Prior to submission of this thesis, the original search carried out for this review was repeated with the same databases. A limiter was applied to the search to only return studies published from May 2015-july 2018. 59 studies were initially identified, on screening the titles, 53 were excluded leaving 6 studies of potential interest. Inspection of the abstracts led to a further 4 being excluded, leaving 2 that were relevant to the reviews research aims and met the original inclusion criteria (Please table 2.3).

Both studies were cross sectional in design and examined the association between illness perceptions and negative adjustment outcomes. Bivariate and multivariate analysis identified that illness perceptions were associated with anxiety, depression and poor quality of life. An emotional response to illness (e.g. feeling angry or scared about the illness) and illness identify (experiencing many symptoms) were found to be the most important illness perceptions in this context. One study also found emotion focused coping strategies correlated with negative adjustment outcomes. Both studies were low in quality. Overall these new studies support the reviews conclusions and the suggested model of adjustment.

Table 2.3: Updated studies

Reference	Population and location	Recruitment and response rates	Study design	Adjustment measure	Psychological variable measure	Relevant findings	Total score
Zhang et al, 2016	China N=159 patients with CD	Single centre Selected sample Inclusion criteria specified Not adequately powered	Cross sectional Correlations	Anxiety and depression (HADS) QoL (IBDQ)	illness perceptions (BIPQ) Coping (Brief- COPE)	Illness perceptions associated with anxiety, depression quality of life. Denial, venting, substance use, behavioural disengagement and self-blame was associated with higher levels of anxiety, depression and lower quality of life.	3/7
Tribbick et al, 2017	Australia N=81 (56 CD 25UC) 42 women	Single centre Convenience sample Inclusion /exclusions criteria not specified Not adequately [powered	Cross sectional Regression analyses	Anxiety and depression (HADS) Quality of life (WHOQoL)	Illness perceptions (BIPQ)	Disease activity, gender, identify predict 13% of variance in depression. Disease activity, IBD type and emotional response predict 42% variance in anxiety. Disease activity gender and identify predict 57% of QoL	2/7

Chapter 3: Theoretical approaches to understanding adjustment to IBD

The systematic review of this thesis proposed a psychological model for understanding adjustment in IBD which was based on cognitive behavioural principles. Cognitive behavioural models of psychopathology are useful because they can pinpoint specific psychological processes linked to negative adjustment outcomes which can be targeted for intervention using well-established strategies. This chapter will provide an in-depth consideration of the classical CBT model and the more recently developed third wave CBT approach acceptance and commitment therapy for understanding psychopathology. These frameworks are employed throughout this thesis to investigate the psychological factors associated with negative adjustment outcomes; anxiety, depression, distress and poor quality of life for people with IBD.

The classical CBT model

A major principle underpinning the classical CBT model of psychopathology is that the way an individual interprets and processes information in relation to internal or external stimuli determines their emotional and behavioural response to it (Knapp et al, 2008). Symptoms of emotional distress are proposed to occur when an individual encounters an event which triggers a maladaptive belief or dysfunctional assumption. Once activated these extreme beliefs are thought to disrupt an individual's ability to objectively appraise events and the process of reasoning is compromised. Systematic cognitive distortions such as over generalising are said to occur when maladaptive

beliefs are activated. This disruption to the process of thinking and consequent disturbance to mood promotes unhelpful or self-defeating behaviour. In turn this behaviour is thought to reinforce and perpetuate unhelpful cognitive and emotional processes (Beck et al, 2005).

A crucial hypothesis of the classical cognitive behavioural model is the notion that specific maladaptive beliefs create a vulnerability for the development of a particular emotional disorder (Beck, 2005). Depression has been found to be associated with cognitive themes of loss and failure. This type of negatively biased interpretation has been found universally across all types of depression (Haaga et al, 1991). It is proposed to lead to sadness, hopelessness and social withdrawal which serves to perpetuate or exacerbate low mood. For example, an individual may receive some minor criticism about a work task which activates the belief that they are a failure. This then leads to ruminating over past failures and predictions of future ones which impacts on mood and motivation, hence plans to meet a friend are cancelled leading to further thoughts of being a failure and further rumination, low mood, withdrawal and so on.

In contrast “danger orientated beliefs” are hypothesised to provoke anxiety, promote selective attention to the perceived threat and catastrophic interpretations of it. This then leads to safety behaviours intended to minimise or prevent the threat. This type of behaviour is considered by the CBT model to perpetuate anxiety as it is perceived as preventative by the individual and prevents disconfirmation of the initial threat orientated beliefs (Salkovskis, et al, 1999). For example, a person with panic disorder is likely to believe that they might die from a cardiac arrest during an intense episode of anxiety. This

leads to close monitoring of symptoms and safety behaviours such as resting in response to an increase in heart rate. The non- occurrence of the feared cardiac event is then attributed to the precautions taken rather than recognising that the physical sensations associated with anxiety are not in fact life threatening. Danger-oriented biases and safety behaviours have been found in every phase of information processing (perception, interpretation, and recall) across all anxiety disorders (Clark et al, 1999).

The self-perpetuating cycle of cognitive, emotional and behavioural responses is central to CBT conceptualisations of psychopathology. Originally constructed to explain the psychological processes underlying depression, the CBT model has been applied across a range of mental health problems to investigate the psychological factors which precipitate and perpetuate symptoms (Deary et al, 2007). More recently this model of perpetuation has been utilised in several long term physical health conditions to explore if unhelpful cognitive, behavioural and emotional responses to disease symptoms influence the process of adjustment resulting in disturbances to mood and functioning. Feeling embarrassed, preoccupied and catastrophic about symptoms whilst engaging in all or nothing behaviour, avoidance and excessive resting have all shown associations with negative adjustment outcomes in a range of long term conditions including multiple sclerosis (Dennison et al, 2010) and cancer (Suleman et al, 2018). In this thesis the classical cognitive behavioural model will be utilised to investigate the specific situations, cognitions, emotions and behaviour linked to symptoms of anxiety, low mood, psychological distress and poor quality of life for people with IBD and any potentially unhelpful interactions between these factors. Further it will inform the development and

evaluation of a non-randomised uncontrolled trial of a clinic based CBT intervention for improving adjustment outcomes for people with IBD and moderate to severe levels of anxiety and depression.

The acceptance and commitment therapy (ACT) model.

This recently developed third wave CBT approach proposes that psychological inflexibility is central to the experience of emotional distress. This psychological rigidity is proposed to emerge from six interrelated and interacting cognitive and behavioural processes. Experiential avoidance refers to attempts by an individual to alter or avoid unwanted thoughts, emotions or bodily sensations. These avoidance based strategies are frequently ineffective and can serve to increase distress in the long term and prevent the individual from engaging in activity they most value. For example an individual may avoid an important work opportunity due to feeling anxious about failing at it. Although the anxiety is potentially reduced in the short term, it will reoccur when faced with a similar situation and the valued opportunity is missed. The model suggests that difficult cognitive, emotional or sensory experiences are not necessarily problematic in and of themselves. Instead, it suggests that it is attempts to avoid these experiences and disengagement from meaningful life activities in the service of this avoidance that creates suffering (Hayes et al, 2006).

Cognitive fusion supports experiential avoidance, it occurs when an individual's thoughts direct their behaviour, rather than choosing behaviour that is motivated by valued goals. In this instance the person will avoid the work opportunity because they have engaged with and acted on the thought that

they are not capable of it, rather than recognising the tendency to have such thoughts when faced with a challenging situation. This type of fusion can also be identified in conceptualisations of the self, a further core concept postulated to underpin psychological inflexibility in the ACT model. Here the individual over identifies with and acts on a particular negative description of themselves (Hayes et al, 2013). In addition the ACT model hypothesises that dwelling on past or future experiences rather than focusing on the here and now exacerbates emotional difficulties. This attentional pattern is known to exacerbate problems such as trauma (Holman & Silver, 1998), rumination (Davis et al 2000), and pain (Schutze et al., 2010). In combination these psychological processes disrupt the pursuit of meaningful action towards valued goals, instead the individual's behaviour is driven by the desire to avoid distress resulting in self-defeating patterns of behaviour (Hayes et al, 2013).

The ACT model of psychological intervention targets the process of thinking rather than the content as would be the case with classical CBT treatment protocols. It aims to reduce the behavioural and functional influence of thinking by fostering a general process called psychological flexibility. This is defined as being open, aware and in contact with the present moment, and flexibly engaging in behaviours which facilitate overarching life goals (Hayes et al, 2013) ACT sees many forms of distress as a natural consequence of being human. ACT does not explicitly aim to reduce distress but instead aims to increase the individual's ability to undertake meaningful activity in its presence (Graham et al, 2016).

Psychological inflexibility and experiential avoidance have been linked to negative adjustment outcomes in a range of physical health problems including cancer (Hulbert-Wiliams et al, 2016) and chronic pain (McCraken et al, 1998). Whilst symptom tolerance and activity engagement has been found to correlate with positive adjustment outcomes in one study of people with IBD (kiebles et al, 2010). To elucidate further the influence of these factors on adjustment outcomes for people with IBD, several measures have been selected for inclusion in the cross sectional and prospective study of this thesis to capture aspects of the ACT model. Specifically the acceptance scale adapted from the chronic pain acceptance questionnaire (CPAQ) (McCraken et al, 2004) was used to measure acceptance beliefs towards symptoms and the beliefs about emotions scale (BES) (Rimes et al, 2010) to assess unhelpful beliefs about experiencing and expressing negative emotions. These findings will give a preliminary indication of the utility of aspects of the ACT model of psychological intervention for understanding and improving adjustment outcomes for people with IBD.

Multiple models have been proposed in the wider psychological literature to explain the variation found in adjustment outcomes for people with long term conditions. These include for example; the stress and coping model (Lazarus & Folkman et al, 1984) which emphasises the role of coping strategies used by individuals to deal with the challenges and tasks imposed by the disease and the self-regulatory common sense model of illness representations (Levanthal et al, 1984) which highlights the role of attitudes and beliefs about the course and impact of the condition on the development of negative adjustment outcomes.

More recent approaches have attempted to draw together the unique elements of each these models into an overarching conceptualisation of adjustment to chronic illness. In a recent systematic review of the empirical evidence several key processes merged across theories as important for facilitating adjustment which included staying as active as the disease reasonably allows, recognising and expressing negative emotions, engaging in effective self-management and benefit finding in the face of the long term condition. Factors which hinder adjustment were not defined (De Ridder et al, 2008). Increasingly the empirical literature calls for a unified approach to investigating the process of adjustment to chronic disease. To bridge the gaps between current models, several reviews have suggested that illness specific stressors and challenges should be determined empirically and linked to specific cognitive, behavioural and emotional responses (Moss-Morris et al, 2013). CBT models are well suited to conceptualising these factors and the relationships between them. Depending on the nature of the psychological processes identified as problematic for adjustment in IBD, CBT or ACT based psychological interventions can then be developed to target unhelpful responses and promote positive outcomes.

Chapter 4: A qualitative study exploring the experience of people with IBD and elevated symptoms of anxiety and low mood and the type of psychological help they would like.

This chapter has been published in psychology & health (full reference below). Presented here is the authors accepted manuscript version of the paper.

Statement of contributions: I generated the idea for the aims of this study which in conjunction with TC was developed into a study protocol. I planned and executed the interviews, carried out the data analysis, synthesis and write up of the paper. To ensure rigour in this process RO reviewed the analyses, themes, sub themes and final template. Both TC & BH were involved in developing, drafting and revising the paper.

Reference : Cheryl Jordan, Ruth Ohlsen, Bu'Hussain Hayee & Trudie Chalder (2018) A qualitative study exploring the experience of people with IBD and elevated symptoms of anxiety and low mood and the type of psychological help they would like, Psychology & Health, 33:5, 634-651, DOI: 10.1080/08870446.2017.1381958

4.1: Abstract

Background. People with Inflammatory bowel disease (IBD) are at increased risk of developing anxiety and low mood. We sought to explore the experience of people with IBD and moderate- severe symptoms of anxiety/low mood to identify psychological processes which could be targeted in psychological interventions, as well as the kind of psychological support preferred.

Methods: Twenty five participants with IBD and moderate- severe symptoms of anxiety/low mood were recruited for interview. Template analysis was utilised to analyse interview data. We explored the situations, cognitions and behaviour linked to symptoms of anxiety and low mood by people with IBD, as well as the kind of psychological help preferred.

Results: Two themes were identified within participants accounts of symptoms of anxiety; “under performance “and “preventing an accident”. Two further themes were identified for symptoms of low mood; “lack of understanding” and “stigma”. Expertise and understanding was the main theme identified for the type of psychological help desired.

Conclusion: The analysis highlights situations, cognitions and behaviour linked to anxiety and low mood by people with IBD and the type of psychological support desired. Our findings link to the knowledge and competencies set for psychological therapist working with long- term conditions.

Key words: Inflammatory bowel disease, anxiety, depression, cognitive behavioural responses, psychological support.

4.2*:* Introduction

Inflammatory bowel disease (IBD) including Crohn's disease and ulcerative colitis, is a long term disease with no known cause or exact cure. Iintermittently the intestines become swollen and inflamed leading to periods of debilitating symptoms which include diarrhoea, fatigue and pain in the abdomen. The fluctuating episodic nature of IBD has been reported to disrupt employment, social and leisure activities, relationships and psychological well-being (Restall et al, 2016, Kemp et al, 2012). The empirical evidence suggests the life time prevalence rates of anxiety and depression for people with IBD is as high as 35.8% (Walker et al, 2008). The presence of disturbance to mood has also been identified as an independent risk factor for more frequent disease activity and is associated with a reduced quality of life (Mittermaier et al, 2004, Graff et al, 2006, Mikocka-Walus et al, 2016).

Although disease related factors such as remission status, frequency of relapse, pain severity, and extra intestinal manifestations have been linked to psychological adjustment in IBD, evidence suggests that psychological factors have a comparable influence (Jordan et al, 2016). A recent systematic review found that emotion focused coping strategies, extreme perceptions of the illness and of being stressed were significantly associated with worse mental health outcomes, and this was maintained when controlling for the influence of clinical factors (Jordan et al, 2016). However this body of quantitative research has been criticised for failing to capture the full experience of living with IBD. Qualitative studies have reported that people with IBD fear embarrassing symptoms occurring in public and describe feeling isolated, yet no quantitative studies have utilised measures to assess this (Kemp et al,

2012). These qualitative findings arguably provide a richer illustration of the burden of living with IBD from the patients perspective but currently offer no insight into how these experiences link to symptoms of anxiety and low mood.

Despite this gap in understanding a range of psychological approaches to enhance emotional states, for adults with IBD have been developed and tested. Initially psychodynamic and stress management approaches were trialled with limited efficacy (Timmer et al, 2011). More recently cognitive behaviour therapy has shown some promising results for improving the mental health of adults with IBD post intervention and at 6 month follow up (Knowles et al, 2013). However, apparent across all studies is a lack of information given about which psychological processes were targeted within interventions and how these factors were related to disturbances in mood (Timmer at al, 2011). A pre-requisite for establishing effective and targeted interventions is a more thorough understanding of the cognitive and behavioural responses linked to psychological adjustment in IBD. This has been demonstrated in the development of CBT interventions specifically for multiple sclerosis (MS), where the intervention was in part based on insights gained through qualitative exploration of the adjustment process (Dennison et al, 2012). For adults with IBD this is of particular importance as they have been reported to express a higher need for psychological support than other chronic disease populations. Further, this need is associated with worries about the disease and symptoms of anxiety rather than with medical variables (Miehsler et al, 2008).

The goal of this mixed method study is therefore to explore and report the experience of adults with IBD and moderate to severe symptoms of anxiety and low mood. Our aim is to hi-light commonalities of experience and illuminate psychological processes which it would be possible to target in psychological interventions. It is envisaged that our findings will not only contribute to the content of future psychological interventions but also provide knowledge that will support psychological therapists in achieving the competencies required to deliver it.

Specifically our primary research aims were to 1) investigate the specific situations, thoughts, perceptions, appraisals, beliefs and behaviour that people with IBD describe as linked to their symptoms of anxiety and low mood 2) explore the type of psychological help or support people with IBD and elevated symptoms of anxiety and low mood would like as part of routine medical care. A secondary aim was to consider our findings in relation to the knowledge associated with the competencies set for psychological therapists delivering interventions for long term conditions.

4.3: Method

Study design

A mixed method research design was adopted for this study. A qualitative approach with in-depth semi-structured face to face interviews was used to explore the experiences of adults with IBD who reported moderate to severe symptoms of anxiety and/or low mood on the GAD7 and PHQ9 measures

respectively (Spitzer et al, 2006, Spritzer et al, 1999). Individual rather than group interviews were chosen as participants may have been reluctant to fully disclose personal and sensitive information in a group setting due to fears about judgement or confidentiality. Data were analysed using template analysis as detailed by King et al (2017), a technique which is well suited to answering practical research questions in real world settings. Further, it is compatible with the neo- positivist position assumed by this study in that we aimed to report the reality evident in the data in relation to participant's experience of symptoms of anxiety and low mood and drew on CBT theory to inform constructs within our analysis (King et al, 2017). This mixed methods study was nested within a larger epidemiological study measuring illness perceptions, anxiety, depression, quality of life and functioning over a 3 month period.

Patient and public involvement

People with inflammatory bowel Disease (IBD) were actively involved in formulating the design and conduct of this study. Consultation was sought from two individuals with IBD for developing the participant information sheet, invitation to participate letter and topic guide for the qualitative interviews. Ways to maximise participation and recruitment were also discussed and resulted in the qualitative interviews being offered via telephone/skype in order to reduce burden for participants. Further, as discussed below the interview schedule was piloted with two patients prior to the study commencing and a small group of participants reviewed our findings and considered their relevance and accuracy.

Recruitment

Participants were recruited through an IBD clinical service in South East London, United Kingdom. Initially people over the age of 18 with a confirmed diagnosis of IBD where invited to take part in a cohort study measuring illness perceptions, anxiety, depression, quality of life and functioning over a 3 month period. A total of 150 people participated in this study, on its completion participants were asked to indicate their willingness to be interviewed. Following the initial analysis of demographic data, interested respondents were organised into subgroups based on their anxiety and depression scores. We then reviewed the pool of participants with scores in the moderately severe to severe range for symptoms of anxiety and/or low mood on the GAD7 and PHQ9 questionnaires (n=42) (Spitzer et al, 2006, Spritzer et al, 1999). To capture the diverse impact of IBD we purposely selected individuals of varied age, ethnicity and gender for each threshold score within the moderately severe to severe range On this basis we selected 33 people for inclusion in the interview group. Of these 3 were not contactable, 2 arranged an interview but were subsequently not contactable and 3 changed their minds about participating. Thus the analysed sample consisted of 25 participants.

Procedure

Interviews were offered via telephone, Skype or face to face for flexibility and to lessen any potential burden to participants. All participants selected to meet with the lead author (CJ) in person within the clinical service with the interview being scheduled to coincide with their routine medical appointments. Immediately prior to the start of the interview each participant repeated the

following measures to establish current levels of anxiety, low mood and disease activity and these are reported in table 1; the generalised anxiety disorder 7 measure (GAD7), a self- report questionnaire which measures key symptoms of generalised anxiety disorder. Scores in the 10- 14 range advocate a moderate level of symptoms, whilst 15 and above implies severe (Spitzer et al, 2006). Symptoms of low mood were measured by the patient health questionnaire, a multiple choice self -report inventory (PHQ9). Scores in 15-19 range signpost moderate symptoms of low mood, a score of 20 or more, severe (Spritzer et al, 1999). Current levels of symptomatic disease activity were measured by the Harvey Bradshaw Index (HBI) (Harvey et al, 1980) for participants with Crohn's disease and the Simple Clinical Colitis Activity Index for participants with ulcerative Colitis (SCCAI) (Warmsley et al, 1998). The score derived from the HBI is based on 5 items that assess general well-being, abdominal pain, number of liquid stools per day, abdominal mass, and complications or extra intestinal manifestations. The score derived from the SCCAI is based on 6 items that assess daytime and night time bowel movements, urgency, and presence of blood in the stool, general well-being, and extra intestinal manifestations. Scores of <5 on the HBI and <3 on SCCAI are considered to suggest remission (Higgins et al, 2005).

Subsequently a one to one interview was conducted which typically lasted for 45 minutes. All interviews were conducted in English and followed a semi-structured schedule. Once the interviews were completed participants were given the opportunity to ask questions and were provided with information regarding accessing psychological services. All participants completed consent forms. Interviews were recorded and transcribed verbatim by the principal

investigator and took place from August 2015-Feb 2016. This study was approved by the NRES committee London-Bloomsbury (REC reference 12/LO/1510).

Data collection

As this study focuses specifically on the experience of adults with IBD and elevated symptoms of anxiety and low mood an interview guide was constructed by the authors which focused on the following areas (1) situations or events which the person felt most anxious or depressed about, such as specific symptoms of the disease or situations which were difficult because of it (2) the meanings, appraisals and cognitions that were experienced about such events, as well as consequent emotional and behavioural responses (3) the type of emotional or psychological help or support the person would like to receive as part of routine medical care. Key interview questions included "Tell me what you feel anxious/ low about?" Can you tell me some of the things that go through your mind when you feel anxious or low in mood? What do you do when you feel anxious or low to cope with the situation? What help or support would you like with this as part of your IBD treatment & care? The interview schedule was piloted with two patients prior to the study commencing and no amendments were found to be necessary as a result.

Data analysis

All interviews were transcribed verbatim and analysed by the principal author (CJ) using template analysis (King et al, 2017), assisted by Nvivo version 10 (http://www, qsrinternational.com). This deductive method was chosen

because it is suited to studies with particular applied concerns which need to be incorporated into the analysis. Commonly the first procedural step involves identifying some potential “A priori” themes which are pertinent to the research question and expected in the data. Given the aims of this study, our initial template for analysis was organised around 1) symptoms of anxiety and associated situations, beliefs and behaviour 2) symptoms of low mood and associated situations, beliefs and behaviour 3) the type of psychological help wanted. Interview transcripts were analysed on a manifest level where visible and obvious components of the text relating to these broad domains were identified, coded and grouped into meaningful clusters. Consequently several subthemes were identified within each “A priori “theme. These detailed situations participants described as sources of symptoms of anxiety and/or low mood as well as specific cognitive and behavioural responses to these. As we aimed to hi-light commonalities in experience features in the data were considered a subtheme if they occurred across four or more transcripts. Data not fitting any themes or subthemes was placed in its own category and then reanalysed. No further themes were identified as a result. To ensure rigour, the final template was reviewed by two of the authors (CJ & RO). Themes and subthemes were verified through discussion and with reference to examples found in the qualitative data. Any disagreements were resolved through discussion with TC. CJ is an experienced psychological therapist with an interest in understanding and treating distress in IBD. Both RO and TC are experienced qualitative researchers and clinicians with an interest in understanding distress in long term conditions. The final template is presented in appendix 2.

Validity

We followed the approach of Creswell and Miller (2000) to strengthen the credibility of our findings. Firstly to minimise the risk of researcher bias a consistent interview process was adhered to. Secondly, all themes are illustrated with rich descriptive quotes which were taken directly from raw data. Finally, a small group of participants reviewed our findings and considered their relevance and accuracy. No amendments were requested as a result of this.

4.4: Results

Participants

A total of twenty five individuals, 11 males and 14 females participated in this study. Eleven had a diagnosis of Crohn's disease and fourteen ulcerative colitis. Based on self- report scores derived from the Harvey- Bradshaw index of Crohn's disease activity (HBI) and Simple Clinical colitis activity index (SCCAI) the majority of the participants were currently in remission. The mean age of participants was 36.5 years (range 22-68 years), mean time since diagnosis was 5 years (range 1-20years). The participants reported a range of ethnicities. All participants scored in the moderate to severe range for depressive symptoms on PHQ9 (range from 11-20) and/ or symptoms of generalised anxiety disorder on GAD7 (Range 11-21) at the time of interview. Demographic, psychological and disease related factors are shown in table 4.1.

Table 4.1. Sampling Characteristics

	Total (n=25)	%
Female	14	56%
Age		
20-29	6	24%
30-39	10	40%
40-49	4	16%
50-59	2	8%
60 and over	3	12%
Ethnicity		
British white	16	64%
British Caribbean	3	12%
British African	1	4%
Irish white	2	8%
Turkish	2	8%
Spanish	1	4%
Ulcerative colitis	14	56%
Crohn's disease	11	44%
Symptomatic disease activity		
Inactive (<5 HBI) (<3 SCCAI)	19	76%
Disease duration		
< 1yr	3	12%
1-3 yrs.	7	28%
5 -6 yrs.	6	24%
7-10 yrs.	5	20%
15-20 yrs.	4	16%
Anxiety (GAD7)		
Moderate (10-14)	10	40%
Severe (>15)	15	60%
Depression (PHQ9)		
Moderate (15-19)	21	84%
Severe (20- 27)	4	16%

Findings

To align with the focus of this study our analysis concentrated on three main areas;

1. Symptoms of anxiety and the situations, appraisals, beliefs and behaviour linked to these emotional experiences by people with IBD.
2. Symptoms of low mood and the situations, appraisals, beliefs and behaviour linked to these emotional experiences by people with IBD.
3. The type of psychological support wanted.

These overarching themes, and their component subthemes will now be described and discussed with the use of illustrative quotes.

1. Symptoms of anxiety

The majority of participants associated their symptoms of anxiety with concerns about their ability to function at work due to episodic disease activity. Anxiety was also linked to attempts to influence or manage the onset of symptoms. Participants were particularly anxious about preventing an accident when out in public and this promoted a range of behavioural responses designed to minimise the probability of this occurring.

Underperformance at work

Participants reported being anxious that either absence or reduced functioning in the work setting due to symptomatic disease activity, would result in their reputation being compromised. As a consequence, participants described

being concerned that they would be side-lined into a lesser role or at worse sacked or made redundant, although there was no objective feedback to suggest this. The financial impact should this happen was identified frequently as a major source of anxiety for participants. For example one participant said;

“It’s stressful when it comes to work and my finances. I am a self- employed actress and I really worry about the impact being ill is going to have on this. If I get sick and take time off, or last minute I can’t make it in then people will think I am unreliable and won’t offer me any further work. It goes on reputation a lot and if mine becomes sketchy I don’t know want will happen. If I don’t get paid you can imagine, how I will pay my mortgage and all that” (P1, age 47, UC)

Participants described an all or nothing behavioural response to these cognitions. This entailed working extended hours and taking on more whilst feeling well, to compensate in advance for future periods of reduced functioning due to illness. For example one participant said;

“When I think a flare might be coming on I do as much work as I can before , get as much done as possible because I know I might need to stop soon and take time off ” (P2, 40 CD).

This boom or bust behaviour was described by participants as having negative consequences in that it led to tiredness or fatigue which was cited as a further risk factor for underperformance at work. Participants frequently described a pattern of cycling between periods of excessive occupational activity followed by periods of retreat. For example one participant described;

“I exhaust myself to get as much done as I can if I am feeling ok, I then worry about how I am going to get on with all my work when I am so exhausted after doing so much. I feel like I am going to slip even further behind, I but I have to stop , rest, do nothing for a bit before I can get on with any more” (P13, 43 UC)

IBD symptoms has been reported to disrupt work activities in previous qualitative studies (Devlin et al, 2014). Our findings link this experience to specific concerns about the consequences of underperformance in the work place and to feelings of anxiety. This was reported to motivate an all or nothing behavioural response which was thought to be unhelpful for energy levels and perpetuated concerns about occupational underperformance. These psychological processes could be addressed in a psychological intervention and a more helpful behavioural response could lead to a reduction in anxiety and more consistent energy levels.

Preventing an accident

The accessibility of toilets was described by participants as a significant source of anxiety which persisted even when a flare episode had subsided. Participants reported panicking when they were in a situation where toilet accessibility was obstructed or absent or when considering future situations where this might be the case. In both examples, this particular anxiety was described as being an overwhelming experience that it was difficult to disengage or become distracted from. For example one participant reported;

“I have a job where I am dealing with staff and students all day long, face to face. So I find myself in the middle of conversations thinking what if I need the toilet, how will I get out of this meeting? As soon as I think that I can’t focus any more I am just thinking about needing to get out, dreading anyone being in the toilet, I get really panicked about this” (P7, UC, age 34)

In order to manage these anxieties participants reported multiple behavioural strategies intended to manage or minimise anxiety about the occurrence of an accident in public. These included avoiding or restricting the use of public transport or where possible opting for transport that provided a sense of being more in control such as cycling. For example one participant said;

“I won't get on the tubes, I started to cycle to work as that way I can stop if I need to” (P9 aged 24 CD)

Having knowledge of the whereabouts of toilets and carrying spare clothes in case of “an accident” was another way that participants described managing their anxiety in this situation. In addition participants described getting up extra early in order to extend the time available to use the toilet in the mornings before leaving the house and reported restricting both what and when they ate. For example one participant described;

“I just don’t eat through the day and only eat in the evenings to avoid possible accidents. If there is nothing in there then there is nothing that can come out is my thinking”. (P11 age 48 UC)

On occasions participants described avoiding leaving the house. This was reported as a last resort strategy when feeling overwhelmed by the preparation considered necessary to minimise an accident outside of the

house. Participants reported that this had negative consequences for their mood as they were concerned that this would leave them susceptible to becoming socially isolated. For example one participant described;

"I just don't go out some times, sometimes because I am not feeling well or am tired or just can't face the anxiety of going out, getting prepared and not knowing what my bowels might do, I feel low then, stuck in the house, it worries me that I might end up a bit isolated" (P12 Age 62 CD)

Clearly participants go to considerable lengths to manage or minimise their anxiety about toilet access both in the moment and in anticipation of future situations. An unintended consequence of continuing to plan journeys around toilet locations or carry spare clothes beyond a flare episode seems to be that it maintains focus and attention on the feared event. Maintaining close proximity to toilets and having concerns about an accident occurring in public has been identified as part of the burden of living with IBD in several previous qualitative studies. Our findings link this behaviour and concern with symptoms of anxiety and indicates specific behavioural responses which it may be beneficial to target in a psychological intervention to reduce anxiety.

2. Symptoms of low mood

Perceiving that others misunderstood IBD was reported by participants as a source of low mood which often led to social withdrawal. Where participants believed others were familiar with the illness this was often reported to lead to fears about judgement and stigma. In both examples illustrated below, perceiving others to hold negative and inaccurate judgements seems to be focal to the participants behavioural reaction.

Lack of understanding from others

The vast majority of participants linked feeling low in mood with perceiving a lack of understanding from their family members, friends and employers. Frequently interviewee's reported that IBD was mistaken for irritable bowel syndrome which they felt underestimated the severity of their condition. As a result participants reported that they often felt that others were dismissive of their symptoms and lacked empathy towards them. In response to this participants reported withdrawing socially; for example one participant said;

"With friends I don't think they understand that it's not IBS, and that its chronic it will always come and go. Nobody understands so I just don't bother talking about it or seeing people, it's miserable, I feel low" (P7, UC, age 34)

This behavioural response was linked to low mood by participants. By withdrawing from friends the opportunity for social support is reduced and the perception "that no one understands" is likely to remain intact. The resulting isolation is reported to be unhelpful for mood as it perpetuates feeling low. IBD has been found to impact on relationships in previous qualitative studies. Our findings link this experience to low mood and highlights the perceptions and appraisals about others which motivate social withdrawal. To improve mood these appraisals could be tested for accuracy by increasing social activity as part of a psychological intervention.

Stigma

Some participants also linked feeling low in mood with concerns that they would be stigmatised and alienated by others due to the nature of the symptoms of IBD being focused around the bowels. Participants were particularly concerned that others would think they were unclean and as a consequence would avoid them or not want them involved in food preparation. For example one participant described;

"I am not the person you want preparing food. It's the difference between the charity shop and a designer boutique. If you go to a charity shop you might touch things and then use hand gel, I am the charity shop, it's depressing" (P12, UC age 29)

Behaviourally participants described a range of strategies intended to overcompensate for these concerns. Participants described appearing well groomed to others as a necessity and reported going to great lengths to demonstrate high levels of personal hygiene, for example one participant reported;

"I make a big effort to show them that I am washing my hands before I prepare food or touch anything" (P21, UC age 50)

For some participants concerns about stigma extended to their consideration of prospective romantic relationships as IBD was seen as a major obstacle to establishing a relationship. Concerns often focused on whether the disease rendered them unattractive to others for example;

"I can't imagine anyone finding me attractive what with this. Who wants a girlfriend with gut problems, it's depressing" (P23, CD age 30).

Participants described how this often meant they avoided disclosing their diagnosis for some time or underplayed the impact of their symptoms. This potentially contributes to the perception that others misunderstand IBD. Testing out the accuracy of appraisals linked to feeling misunderstood and stigmatised may therefore be central to a psychological intervention targeting low mood in IBD.

3. Psychological support: Expertise and understanding

Overwhelmingly participants described that they would like some support from a professional with specialised knowledge of IBD, its symptoms and emotional impact. Interviewee's reported wanting to make sense of the illness, their emotions and coping strategies. For example one participant said;

"A professional to talk to who knows about the illness, gets it. To help me work out some of this stuff. Help me think through decisions I am making, work out what helps and what doesn't. Someone to share it with I guess and get some feedback" (P25, CD age 45).

Participant accounts highlight a motivation to adjust to the demands dictated by IBD and a desire for professional support to achieve this. Knowledge of IBD and its biopsychosocial impact was identified as crucial for the psychological therapist providing such support and we anticipate that our findings might be useful for developing this. Given that participants in our study cited feeling misunderstood as source of low mood, familiarity with IBD may be essential for psychological therapists to achieve competency in working with this group.

Some participants reported that talking to other people with IBD in a group setting was useful as it helped to normalise the experience of IBD and reduce the sense of being alone, for example one interviewee said;

“It helps to talk and to know that there are others that are experiencing the same. Talking to others has been useful, I joined a support group and that was useful” (P8, UC age 42).

This suggests that there may be advantages to delivering a psychological intervention in a group format. It could provide participants with a shared experience which may counteract the social isolation frequently described by participants in our study as a consequence of symptoms of anxiety and low mood.

4.5: Discussion

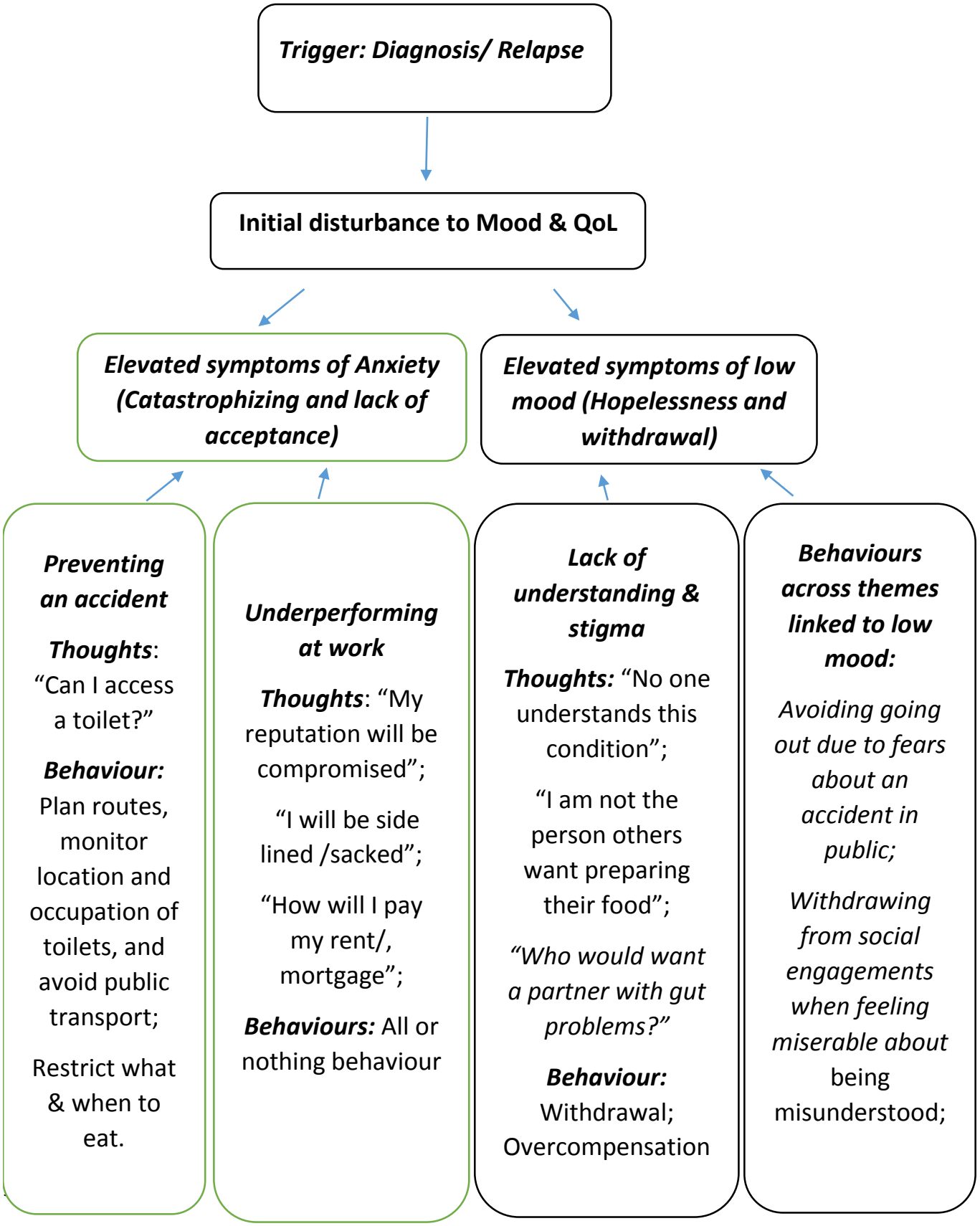
The results of our analysis link symptoms of anxiety for people with IBD to concerns about occupational underperformance and having an accident in a social situation. Within each of these domains distinct cognitive and behavioural responses have been described by participants and are illustrated in figure 4.1. Participants main behavioural response to concerns about the consequences of reduced occupational functioning was to increase their workload in order to compensate in advance for future periods of sickness. This type of boom or bust behaviour whereby sustained periods of excessive activity are followed by episodes of withdrawal has been linked to fatigue in several long term conditions such as multiple sclerosis (Skerrett et al, 2006). Our results show that participants frequently linked this behaviour to fatigue

which was perceived as a further risk factor for occupational underperformance. Adopting an all or nothing behavioural response in this context may therefore be unhelpful for people with IBD in that it may precipitate or maintain fatigue which could perpetuate concerns about underperforming and maintain anxiety levels. In addition this may influence the course of IBD as elevated levels of anxiety and stress have been linked to more frequent disease activity in several longitudinal studies (Camara et al, 2009, Mokoka-Walus et al 2016).

A prevalent concern for the vast majority of participants was preventing the occurrence of an accident in public. This is consistent with the results of several previous studies exploring the lived experience of people with IBD (Dudley-Brown, 1996, Burger, 2005, Hall et al, 2005). Importantly the results from our study suggest that it is the perception or recognition that a toilet is inaccessible that triggers feelings of anxiety, rather than symptoms or sensations originating from the bowels. In response to this anxiety participants described a wide range of behaviours from changing modes of travel and carrying spare clothes to adjusting eating habits. Coping behaviours such as these which are intended to manage the anxiety and prevent the feared event occurring have been identified in a range of anxiety disorders and are referred to as safety seeking behaviours (Salkovskis, et al, 1998). Although arguably helpful in the short term, over prolonged period's safety seeking behaviours have been found to amplify anxiety by maintaining attention and focus on the feared event and preventing a realistic appraisal of it. In the context of IBD, a flare up in disease activity might initially necessitate a hyper vigilance towards symptoms and safety seeking behaviours such as knowing the location of

toilets. Once symptoms begin to subside this selective attention to symptoms may be less useful and serve to focus the individual's attention on the feared event and provoke feelings of anxiety. As anxiety has been associated with increased bowel frequency in several studies (Gorard et al, 1996), this may cloud appraisals and maintain this fear.

Figure 4.1: Thematic map of cognitive, behavioural responses linked to symptoms of anxiety and low mood in IBD



Feeling misunderstood and stigmatised was linked to symptoms of low mood by participants in this study. Participants described thinking that others would find them less attractive as a potential partner and would not want them involved in food preparation given the nature of their IBD symptoms. In response to these concerns participants described overcompensating by demonstrating excessive cleanliness, a behaviour likely to focus attention and perpetuate preoccupation with this concern. Perceptions of stigma have been linked to depression in one previous study (Taft et al, 2009). In response to thinking that others misunderstood their illness participants described cancelling social plans. This pattern of behavioural disengagement was apparent across other subthemes identified in our analysis as participants also reported withdrawing from social events to prevent accidents occurring in public. In all cases participants described feeling low in mood as a consequence. Behavioural withdrawal and avoidance has long been associated with low mood in the wider psychological empirical literature and is considered to be a perpetuating factor for depression (Ferster, 1973). Multiple quantitative studies of the psychological correlates of IBD have also linked this type of behaviour to poor psychological health (Seres et al, 2008, Dorian et al, 2009 Mussell et al, 2004, Petrak et al, 2001). Reducing activity levels in response to the many concerns and challenges posed by IBD is therefore likely to be unhelpful for mood. As depression has been found to lead to earlier and more frequent relapse in IBD, it is possible this behavioural response may also exert an indirect influence on disease activity and vice versa (Mikoka-Walus et al 2016).

Overall our analysis highlights the situations, cognitions and behaviours linked to symptoms of anxiety and low mood by people with IBD and we have hypothesised some potentially unhelpful interactions between these factors. Anxiety related responses appear catastrophic and lack acceptance whilst responses related to low mood were more characterised by hopelessness and withdrawal. Encouragingly cognitive and behavioural responses are potentially modifiable factors which it is possible to address in a psychological intervention and the vast majority of participants in our study stated a desire for psychological support. Significantly, our findings suggest a strong preference for this to be delivered by a compassionate practitioner who can draw on specialised knowledge of the key symptoms of IBD and their impact on functioning and mental health, with a focus on building coping strategies.

Transdiagnostic cognitive behavioural therapy (TD-CBT) would be well suited to promoting more adaptive responses in order to restore disruptions to mood. This approach is based on traditional cognitive behavioural principles with a particular emphasis on the way people respond to their emotions. Strategies include psychoeducation to introduce the main components of an emotional experience, namely thoughts, physical sensations and behaviour and the reciprocal relationships between these domains. This three component model is then employed across sessions to recognise and track emotional experiences. This enables the individual to understand their responses to emotional triggers and situations and assess the short and long term consequences of their emotion driven behaviour. Where behaviour is identified as unhelpful the individual can work towards acting in alternative ways. For example, anxiety was linked to toilet accessibility when travelling on

trains by participants in our study. A common behavioural response was to stay close to the toilet and monitor its occupation. On consideration, this might be recognised as unhelpful in that it maintains attention and focus on the feared event and amplifies feelings of anxiety. An alternative response might therefore be to sit slightly further away and focus attention on a more neutral activity thus lessening preoccupation and anxiety. Mindfulness and attention training exercises are employed to encourage such present focused awareness and support the development of alternative adaptive emotional responses. A recent meta-analysis which included 24 RCT's found that transdiagnostic CBT treatments outperformed control conditions for reducing anxiety and depression and improving quality of life (Newby et al, 2014).

Finally, our findings suggest that Psychological therapists working with this group would require advanced skills in conducting bio-psychosocial assessments in order to gain a clear picture of the differing psychological processes impacting on mood and levels of anxiety. Recently in the UK, a national curriculum was established to ensure efficacy in the delivery of psychological therapies for anxiety and depression in long term health condition. Our findings link to and support a range of competencies set out to achieve this demonstrated in table 4.2 (Roth & Pilling 2015). http://www.ucl.ac.uk/pals/research/cehp/research-groups/core/competence-frameworks/Psychological_Interventions_with_People_with_Persistent_Physical_Health_Problems

Implications

The findings of this study may therefore have clinical and training implications. To the authors knowledge this is the first time that anxiety and depression has been linked to differing yet specific aspects of IBD and with distinct cognitive and behavioural responses. Psychological therapists will be able to draw on these findings to increase their competency in working with this group of people.

Further these insights could assist clinicians working in IBD services with early detection of disturbances to mood for people with IBD and encourage referrals to psychological services for appropriate support and treatment. This may prevent poor mental health from negatively influencing outcomes for people with IBD. Pharmacological treatment of emotional symptoms may also be beneficial (Jordan et al 2016).

Future directions for research

Our findings provide a framework which could be utilised in future studies. The themes participants identified as sources of anxiety and low mood along with the cognitive, behavioural and emotional responses to these should be measured in quantitative studies exploring the psychological factors linked to psychosocial adjustment for people with IBD. The findings of this study could also be utilised to inform the content of psychological interventions to improve mental health outcomes for people with IBD and to help psychological practitioners achieve competency in their delivery.

Table 4.2: Results linked to therapist competencies.

Theme and findings relevant to competency	***Knowledge associated with competencies identified in the national curriculum for long term conditions***
	Ability to draw on knowledge of specific psychological process that contribute to the development and maintenance of distress, depression and anxiety, such as:
Theme: Symptoms of anxiety: **Sub theme:** preventing an accident. Selective attention to symptoms and toilet accessibility.	- Attentional processes that increase the perceived severity and pervasiveness of sensations and symptoms
Theme: Symptoms of anxiety: **Sub theme:** preventing an accident. Safety seeking behaviours: changing modes of transport carrying spare clothes, restricting what to eat and when. Mapping out the location of toilets.	- Safety seeking behaviours which are understandable in the short-term, but which (in the long-term) tend to strengthen unhelpful beliefs, increase preoccupation and exacerbate concern
Theme: Symptoms of anxiety: **Subtheme:** underperforming at work: I will be sacked. **Sub theme:** preventing an accident: what if the toilet is inaccessible?	Catastrophizing and/or worry ("preparing for the worse") which in turn primes negative ideas and increases preoccupation and may lead to procrastination
Theme: Symptoms of anxiety **Sub theme:** underperformance at work: cancelling plans to rest. **Sub Theme:** preventing an accident: reduction in social activity. **Theme: Symptoms of depression** **Sub Theme:** lack of understanding: social withdrawal.	Unhelpfully restrictive behaviour, such as generalised withdrawal from physical activity or from role-related activity (such as relationships, work, and hobbies), leading to impaired mood, confirmation of unhelpful beliefs, reduced self-efficacy and disengagement from rewarding activities.
Theme: Symptoms of anxiety **Subtheme:** under performance at work: Boom or bust behaviour	All or nothing ("boom or bust") behaviours (undertaking activities beyond the level of which the person is physically or psychologically capable, resulting in symptom surges (e.g. fatigue, pain) and leading to more negative appraisal
Theme: Expertise & understanding: knowledgeable about IBD, understanding, supportive	Ability to reflect upon the assumptions and expectations that people with LTHC may have about being referred for assessment and treatment and how this may impact on engagement

Limitations

This study does however have some potential limitations. Our participants had all taken part in an online survey measuring illness perceptions, anxiety, depression, quality of life and functioning and may therefore be more motivated to pursue psychological or emotional support. It is arguable that our deductions are therefore based on a specific cohort of adults with IBD which may not be generalizable to the wider population, although our findings are congruent with, and build on those of previous studies.

4.6: Conclusion

Our analysis of participant accounts illustrates that concerns pertaining to underperformance and preventing an accident link to symptoms of anxiety whilst low mood was associated with a lack of understanding and stigma. In each of these domains distinct cognitive and behavioural responses were described by participants. Participants in our study stated a desire for psychological support delivered by a professional with specialised knowledge of IBD to evaluate and build their coping strategies. Practitioners will be able to draw on the findings of this study in order to understand the specific psychological processes that contribute to the development and maintenance of symptoms of anxiety and depression for people with IBD.

Chapter 5: Psychological factors and their associations with negative adjustment outcomes. A cross sectional and prospective analysis.

5.1: Abstract

Background. To extend and deepen current understanding of the psychological factors linked to negative adjustment outcomes, this study aimed to investigate the types of cognitive, behavioural and emotional responses associated with, and predictive of negative adjustment outcomes; anxiety, depression, general psychological distress and poor health related quality of life for adults with inflammatory bowel disease.

Methods: Two hundred and twenty two adults with IBD completed measures at baseline of which 170 completed outcome measures again at 3 month follow up. A cross sectional and prospective analysis was carried out to explore the associations between cognitive, emotional and behavioural responses assessed at baseline and anxiety, low mood, general psychological distress and poor quality of life assessed at baseline and 3 month follow up, when taking sociodemographic and disease related factors into account.

Results: A range of unhelpful cognitive, emotional and behavioural responses were found to be associated with baseline cases of anxiety, depression, general psychological distress and poor quality of life for adults with inflammatory bowel disease, when taking sociodemographic and clinical factors into account. In addition, a range of these responses were found to increase the risk of being a case of anxiety, depression, general psychological distress or poor health related quality of life at three month follow up.

Conclusion: A differing range of cognitive, behavioural and emotional responses to IBD were identified as linked to and predictive of disturbances to mood and health related quality of life. The results suggest different psychological factors may need to be targeted in a psychological intervention for different outcomes and for different IBD types. A third wave CBT approach such as acceptance and commitment therapy may be best suited to treating disturbances to the process of adaption in IBD given the nature of the cognitive and behavioural responses identified as risk factors for the majority of outcomes.

5.2: Introduction

The literature review of this thesis (Chapter 2) systematically identified psychological factors related to adjustment in adults with IBD. Emotion focused coping strategies, personality traits (such as neuroticism), perceived stress, emotions and emotional control (such as alexithymia) and IBD related cognitions (such as illness perceptions) were all found to link to negative adjustment outcomes. Importantly, the results of this review suggested that even though sociodemographic and disease related factors such as gender and symptomatic disease activity played an important role in adjustment, psychological variables maintained their significance when controlling for the influence of these factors. All but one study included in this review was cross sectional in design. The lack of any longitudinal data meant that causal relationships between psychological factors and outcomes could not be established and it was not possible to discern which factors were most important for the process of adjustment in IBD (Jordan et al, 2016).

A further consideration identified in this review was the limited number of studies in this area and the broad array of psychological variables that have been examined. The conclusions relating to psychological factors and adjustment were therefore limited by a small quantity of studies focused on a diverse range of psychological variables. Despite these limitations a cognitive behavioural model of understanding psychological adjustment in IBD was suggested. It was proposed that the onset of psychological distress and reduced quality of life and functioning was likely to be associated with a trigger such as the onset of symptoms at the start of a flare episode of IBD and that this initial disturbance to mood and quality of life was likely to be maintained

over time by disease activity but also by cognitive and behavioural responses. Further, this review concluded that future studies should expand the range of cognitive, emotional and behavioural factors examined in relation to adjustment outcomes and employ a prospective design to assess these associations over time (Jordan et al, 2016). A meta-synthesis of qualitative studies reported that people with IBD fear embarrassing symptoms occurring in public and describe becoming isolated as a result, yet these psychological responses have not been explored in quantitative studies. These qualitative findings provided an illustration of the burden of living with IBD from the patient's perspective but offered no insight into how these experiences linked to symptoms of anxiety, low mood, distress or poor health related quality of life (Kemp et al, 2012).

The qualitative study of this thesis (Chapter 4) explored the cognitive, emotional and behavioural responses to IBD symptoms which individuals specifically linked to their symptoms of anxiety and low mood. This was in order to illuminate psychological processes which could be targeted during a clinic based cognitive behaviour therapy (CBT) intervention (chapter 6). Catastrophizing, a lack of acceptance, being preoccupied with symptoms and all or nothing behaviour were linked to anxiety by participants, as were unhelpful behavioural responses to manage the fear of having bowel symptoms when out socially. Behavioural withdrawal and avoidance were major themes identified in participant accounts of low mood (Jordan et al, 2017). These findings not only provided further support for the cognitive behavioural model of adjustment to IBD proposed in the literature review but also highlighted psychological variables worthy of further investigation in a

quantitative study.

The study reported in this chapter aimed to build on the findings of the literature review (chapter 2) and qualitative study (chapter 4) by expanding the range of cognitive, behavioural and emotional responses to IBD symptoms examined in relation to negative adjustment outcomes; anxiety, depression, general psychological distress and poor quality of life. This exploration of a wider range of psychological responses was intended to enrich current empirical understanding of the psychological factors linked to negative adjustment in IBD and potentially provide insight into the type of CBT approach best suited to improving the process of adaptation.

The classical CBT model of emotional distress proposed by Beck (1976) postulates that maladaptive or extreme beliefs contribute to the development of emotional distress. This distress is then perpetuated by unhelpful cognitive, emotional, physical and behavioural responses. Treatment techniques such as behavioural experiments are utilised to modify extreme beliefs about illness or to test out alternative behavioural responses to ultimately reduce distress or improve quality of life.

More recently developed CBT approaches such as Acceptance and commitment therapy (ACT) conceptualise emotional distress as the result of psychological rigidity which leads to a failure to engage behaviourally with valued and meaningful activities. Experiential avoidance (e.g. avoiding or trying to get rid of unwanted experiences) and cognitive fusion (e.g. becoming entangled with inner thoughts and emotions by acting on them) are thought to

promote and sustain psychological rigidity. ACT targets different change processes to traditional CBT. It does not attempt to directly modify the content of extreme beliefs for example through behavioural experiments. Instead it aims to reduce the behavioural impact of unhelpful thinking processes. Mindfulness based strategies are utilised to facilitate an attitude of acceptance towards unwanted experiences and a present moment focus. Further, a range of values based exercises are employed to identify meaningful activities to participate in to achieve valued life goals (Graham et al, 2016).

Psychological measures of cognitive, behavioural and emotional responses to IBD symptoms to be examined in the current study were therefore selected on the basis that they captured 1) the factors identified as important for adjustment in the literature review, or qualitative study, 2) had empirical links to adjustment outcomes in other chronic long term conditions or 3) measured aspects of the CBT or ACT model of emotional distress. Hence the irritable bowel syndrome –behavioural responses questionnaire (IBS-BRQ) was chosen and adapted for use with people with IBD as it measures specific behavioural strategies for managing bowel symptoms (Reme et al, 2010). The cognitive behavioural responses to symptoms questionnaire (CBRQ) (Ryan et al, 2018) was selected because it assesses avoidance of activities due to shame, embarrassment or fear, as well as beliefs about symptom severity, preoccupation with symptoms and all or nothing and resting behaviour. These unhelpful cognitive and behavioural responses to symptoms have been linked to poorer adjustment outcomes in several long term conditions including Multiple sclerosis and Rheumatoid arthritis (Skerett et al, 2006, Irving et al, 2015).

The Literature review and ACT model of emotional distress suggests that the role of acceptance beliefs towards symptoms warranted further exploration. Only one cross sectional study identified in the review examined acceptance and found it to be associated with better adjustment outcomes (Kiebles et al, 2010). The Acceptance scale adapted from the chronic pain acceptance questionnaire (CPAQ) (McCraken et al, 2004) was therefore used to measure this psychological factor.

Aspects of emotional processing were linked to poorer psychosocial outcomes in IBD in the literature review, particularly a heightened awareness of feelings and difficulties in describing and expressing these (Moreno-Jiménez et al, 2007, Boye et al, 2008, Iglesias-Rey et al, 2012, Verissimo et al, 1998, Olbrisch et al, 1982). To elucidate this relationship further a questionnaire to assess unhelpful beliefs about experiencing and expressing negative emotions was included in this study. These types of belief have been linked to distress in other physical health populations and are thought to perpetuate clinical problems by delaying the individual from seeking help or support (Cramer et al, 2005, Rimes et al, 2010). According to the ACT model, unhelpful beliefs about experiencing and expressing negative emotions are likely to have implications for emotion regulation and the acceptance of unpleasant emotional experiences (Rimes et al, 2010).

To address the methodological weaknesses identified in previous studies by the literature review, this current study utilised a cross sectional and prospective design (Jordan et al, 2016).

Study aims

To extend and deepen current understanding of the psychological factors linked to negative adjustment outcomes, this study's first aim was to investigate the types of cognitive, behavioural and emotional responses associated with negative adjustment outcomes; anxiety, depression, general psychological distress and poor health related quality of life in adults with inflammatory bowel disease at a cross sectional level. The second aim of this study was to explore if these cognitive, behavioural and emotional responses were associated with an increased risk of having anxiety, depression, psychological distress and poor health related quality of life at three month follow up in a prospective analysis.

Hypothesis

It was expected that unhelpful beliefs about experiencing and expressing negative emotions (BeS), unhelpful behavioural responses to gastrointestinal symptoms (IBS-BRQ), a lack of acceptance beliefs towards symptoms (CPAQ), avoiding exercise due to a fear it will make symptoms worse (CBSQ: FA), believing symptoms are damaging (CBSQ:D), focusing on symptoms (CBSQ: SF), excessive resting to manage symptoms (CBSQ: AR), all or nothing behaviour (CBSQ: AL) and avoidance of activities due to embarrassment about symptoms and worries about how others will judge symptoms (CBSQ: EA), would be associated with baseline (Time 1) cases of anxiety, depression, psychological distress and poor health related quality of life, when taking sociodemographic, disease related and clinical variables into account. Further, it was anticipated that these cognitive, behavioural and emotional responses would be

associated with an increased risk of being a case of anxiety, depression, general psychological distress and poor health related quality of life at three month follow up (Time 2).

5.3: Material and methods

Study design

Firstly, associations between psychological, sociodemographic, disease related and clinical factors assessed at baseline (Time 1) and cases of anxiety, depression, general psychological distress and poor health related quality of life assessed at baseline (Time 1) were explored cross sectionally.

Secondly, for study participants who completed measures at three months follow up (Time 2) an additional prospective analysis was utilised to investigate the associations between psychological, sociodemographic, disease related and clinical factors assessed at baseline (Time 1) and cases of anxiety, depression, general psychological distress and poor health related quality of life assessed at 3 month follow up (Time 2). The findings of the cross sectional analysis will be presented first followed by the results of the prospective analysis.

Participants

All patients of an IBD clinical service nested within a gastroenterology department of a hospital in the south east London area of the UK and all members of an online patient organisation (IBD relief) were invited to

participate in this study. Potential participants were eligible to take part if they were aged 18 years or over with a diagnosis of inflammatory bowel disease (IBD) which had been confirmed by a gastroenterologist.

Data collection

Participants were contacted in writing and provided with information about the study and invited to complete a set of online questionnaires at two time points; baseline (Time 1) and three month follow up (Time 2). Potential participants were also given the option of requesting paper versions of the online questionnaires to promote inclusion of those unfamiliar with or unable to access the internet. An identical recruitment strategy was followed for both the clinical service and patient organisation. At baseline, data was collected on demographic and general characteristics (gender, age, ethnicity, marital status, years in education, age of diagnosis, work status, health problems other than IBD and type of IBD). Questionnaires measuring cognitive and behavioural factors, symptoms of anxiety and depression, health related quality of life and symptomatic disease activity were also included (details provided below). Three months later (Time 2) participants were invited to repeat the questionnaires measuring anxiety, depression, psychological distress and health related quality of life. Data collection took place between November 2014 and January 2017.

Time 1 and Time 2: Outcomes assessed at baseline and 3 month follow up

Probable symptoms of anxiety, depression and general psychological distress assessed at baseline (Time 1) and 3 month follow up (Time 2) were dependant

variables for this study according to scores on the hospital anxiety and depression scale (Zigmond et al, 1983). This 14 item self-report questionnaire measures levels of anxiety (HADSA: seven items) and depression (HADSD: seven items) over the past week. Each item is assessed on a 4 point Likert scale e.g. “I feel tense or wound up’” 0 (*not at all*) to 3 (*most of the time*). Scores for each subscale range from 0 to 21, with higher scores indicating greater symptoms of anxiety or depression. A score of $\leqslant$7 points is considered “no case,” 8–10 “possible case,” and $\geqslant$11 “probable case” for the presence of anxiety or depression symptoms (Norton et al, 2013). Any participant scoring 11 or more on the HADSA or HADSD at baseline (Time 1) or 3 month follow up (Time 2) was therefore considered to be a moderate anxiety or depression case in the cross sectional and prospective analysis.

General psychological distress at baseline (Time 1) and 3 month follow up (Time 2) was assessed by the total overall score on the Hospital anxiety and depression scale (HADS-T), with a score of 15 or more being indicative of the probable presence of psychological distress (Zigmond et al, 1983, Norton et al, 2013). Any subject scoring 15 or more at baseline was therefore considered to be a psychological distress case in the cross sectional analysis. Participants scoring in the same range at 3 month follow up (Time 2) were considered to be cases of general psychological distress in the prospective analysis.

Health related quality of life was assessed at baseline (Time 1) and 3 month follow up (Time 2) by the Short Inflammatory Bowel Disease Questionnaire (SIBDQ) (Irvine et al, 1996). This 10 item shortened version of the IBDQ-36

assesses the impact of IBD symptoms as well as general wellbeing and emotional status over the last two weeks. Each item is assessed on a seven point Likert scale e.g. “How often during the last 2 weeks have you had to delay or cancel a social engagement because of your bowel problems?” 1 (all of the time) to 7 (not at all). Total scores range from 10 to 70, with a higher score indicating a better QOL. There are no published validated cut-off values for the SIBDQ which indicate a “normal” quality of life. Using Huaman et al’s (2010) estimated value for the IBDQ-36 (209 in the range 36–252) and a previous study as a guide (Swart et al, 2013), a cut off of 56 in the range 7–70 was used to estimate a cut-off for the SIBDQ. Participants with a score of 56 or less were therefore considered to be a poor quality of life case in the cross sectional and prospective analysis.

Time 1: Potential predictor variables assessed at baseline (Time 1)

Patient Characteristics & disease related factors

Gender, age, marital status, ethnicity, years spent in education, work status, type of IBD (Crohn’s disease (CD) or ulcerative colitis (UC)), age at diagnosis, comorbidity (other health problems) and self-reported levels of current symptomatic disease activity were assessed at baseline. Data on disease activity was assessed by the Harvey-Bradshaw Index (HBI) (Harvey et al, 1980) for patients with CD and via the Simple Clinical Colitis Activity Index (SCCAI) for patients with UC (Walmsley et al, 1998). The score derived from the HBI is based on 5 items that assess general well-being, abdominal pain, number of liquid stools per day, abdominal mass and complications or extra-intestinal manifestations. The score derived from the SCCAI is based on 6 items that

assess daytime and night time bowel movements, urgency, presence of blood in the stool, general well-being, and extra-intestinal manifestations. Higher scores indicate more severe symptoms, with scores of <5 on the HBI and <3 on SCCAI considered to suggest remission (Higgins et al, 2005).

Beliefs about emotions scale (BES) (Rimes & Chalder, 2010)

This 12 item questionnaire measures beliefs about the unacceptability of experiencing and expressing negative emotions such as "it is a sign of weakness if I have miserable thoughts" and "if I have difficulties I should not admit them to others". Each item on the scale is measured on a seven point Likert scale ranging from 0 (Totally disagree) to 6 (Totally agree) with a higher total score being indicative of more negative beliefs about emotions (Rimes et al, 2010). This measure showed high internal consistency in this study (Cronbach's α 0.9).

Acceptance scale adapted from the chronic pain acceptance questionnaire (CPAQ) (McCraken et al, 2004)

The 20-item CPAQ-revised was designed to measure acceptance of pain (McCraken et al, 2004). It measures beliefs about the pursuit of life activities regardless of pain e.g. "I am getting on with the business of living no matter what my level of pain is" and about avoidance and control of pain e.g. "I would gladly sacrifice important things in my life to control this pain better". The items on the CPAQ are rated on a 7-point scale from 0 (never true) to 6 (always true). Higher scores indicate higher levels of acceptance. For this study the scale was adapted to reflect the variability of symptoms in IBD, hence the word pain was replaced with "symptoms" e.g. "I am getting on with the business of

living no matter what my level of symptoms is". Internal consistency for this measure was high in this study (Cronbach's α 0.9).

Irritable bowel syndrome- behavioural responses questionnaire (IBS-BRQ) (Reme at al, 2010)

The Irritable bowel syndrome – behavioural responses questionnaire was developed to assess potentially unhelpful behaviours associated with symptoms of diarrhoea, constipation and abdominal bloating. The scale incorporates two subscales (1) avoidance behaviour such as "when I go out I always know where the nearest toilet is" and (2) assesses safety seeking behaviours which are coping behaviours intended to reduce anxiety and prevent the threat from occurring e.g. "I eat specific foods to help me open my bowels less". The scale has 26 items, each rated on a Likert scale from 1 (never) to 7 (always), indicating how persistently the particular behaviour is carried out. The total score, calculated by summing the responses to the 28 items, ranges from 29 to 203. For this study the terminology of the scale was adapted to reflect the diagnosis of IBD (changing IBS to bowel problems on the scale where relevant e.g. "I avoid certain social situations because of my bowel problems"). Internal consistency for both subscales of this measure in this study were high (IBS-BRQ: avoidance: Cronbach's α 0.9, IBS-BRQ: safety seeking: Cronbach's α 0.8).

Cognitive & behavioural responses to symptoms (CBRQ) (Skerett et al, 2006)

Cognitive and behavioural responses to symptoms were assessed by the Cognitive and Behavioural Responses to Symptoms Questionnaire (CBRQ) (Skerett et al, 2006, Ryan et al, 2018). This study used a shortened 18 item

version incorporating two behavioural and four cognitive subscales (Ryan et al, 2018). The cognitive subscales include 1) fear avoidance which focuses on avoidance of exercises due to fear of worsening symptoms (e.g. “I am afraid that I will make my symptoms worse if I exercise”), 2) damage beliefs which measures the belief that symptoms and their severity reflects true damage to the body (e.g. “the severity of my symptoms must mean there is something serious going on in my body”), 3) embarrassment avoidance which quantifies avoidance of social situations due to feelings of shame about symptoms and concerns about others opinion of symptoms (e.g. “I am ashamed of symptoms, I worry others will think badly of me because of my symptoms”) and 4) symptom focusing which assesses attentional focus towards symptoms (e.g. “when I am experiencing symptoms it is difficult for me to think of anything else”). The two behavioural subscales consist of 1) all-or-nothing behaviour which measures the tendency to engage in periods of high activity resulting in overextension and subsequent prolonged periods of resting (e.g. “I tend to do a lot on a good day and rest on a bad day”) and 2) resting behaviour which is characterised by excessive resting and avoidance of activity (e.g. “I stay in bed to control my symptoms”). Each CBRQ item is measured on a five-point Likert scale, scored from 0 (strongly disagree) to 4 (strongly agree), where a higher subscale score indicates more unhelpful cognitions and behaviours. Internal consistency for each subscale was high (Cronbach’s α ranging from 0.8 to 0.9).

Hospital anxiety and depression scale (Zigmond and Snath, 1983)

Symptoms of anxiety and depression were assessed at baseline by the hospital anxiety and depression scale as potential predictor variables for negative

adjustment outcomes at 3 month follow up (Time 2). HADSA and HADSD scores were included in the prospective analysis as continuous data.

Health related quality of life (Irvine J, 1989)

Health related quality of life was assessed at baseline by the Short Inflammatory Bowel Disease Questionnaire (SIBDQ) (Irvine J, 1989). As a potential predictor of negative adjustment outcomes at 3 month follow up (Time 2), SIBDQ scores were included in the prospective analysis as continuous data.

Statistical analysis

Data analysis was performed using Stata SE 19 (Statacorps, 2017). Initial inspection of the data collected at baseline (Time 1) revealed 11 cases were missing 8 items on the HADSA (anxiety) & HADSD (depression) subscales of the hospital anxiety and depression scale (HADS). 23 cases were missing at least 2 items of the Short inflammatory bowel disease questionnaire (SIBDQ), 11 cases were missing between 1 and 10 items on all subscales of the cognitive behavioural responses to symptoms questionnaire (CBRQ), 11 were missing 17 items on the Chronic pain acceptance questionnaire (CPAQ), 9 were missing at least 2 items on the Beliefs about emotions scale (BeS) and for measures of disease activity in ulcerative colitis 2 cases were missing 1 item on the SCCAI and for Crohn's disease 5 cases were missing 2 items on the HBI. For data collected at 3 month follow up (Time 2), 3 cases were missing all 14 items on HADS (anxiety, depression and general psychological distress) and 4 cases were missing all 11 items of the SIBDQ measure. Therefore, when at least 75% of data for each scale was provided, the mean for the other items in the scale was

used in order to substitute a total score. Where more than 25% of data items was missing from any one subscale, a score was not computed and that participant was excluded from analyses involving that variable.

Histograms, kurtosis and skew statistics were consulted to check the distribution of all continuous data assessed at baseline (Time 1) and 3 month follow up (Time 2). This suggested that data had a bimodal distribution with participants having either particularly low or high scores for the following measures at time 1; HADSA (anxiety) $W=0.966$ $df=210$ $p<0.001$, HADSD (depression), $W= 0.961$ $df=210$ $p<0.01$, HADS-T (psychological distress) $W=0.963$ $df=210$ $p<0.01$, SIBDQ (HRQOL) $W=0.975$ $df=200$ $p<0.001$, CBRQ subscales (cognitive behavioural response to symptoms subscales); damage beliefs $W=0.985$ $df=212$ $p=0.03$, all or nothing $W=0.986$ $df=210$ $p=0.03$, avoidance resting $W=0.969$ $df=211$ $p=0.001$, symptomatic disease activity; HBI (Crohn's disease) $W=0.968$ $df=114$ $p=0.007$ & SCCAI (ulcerative colitis) $W=0.948$ $df=101$ $p=0.001$. At three month follow up (Time 2) data continued to show a bimodal distribution for measures of anxiety (HADSA), depression (HADSD), distress (HADS-T) and quality of life (SIBDQ) (HADSA $W=0.975$ $df=166$ $p=0.004$, HADSD $W=0.950$ $df=166$ p-<0.0001 , HADS-T $W=0.960$ $df=166$ $p=0.0001$, SIBDQ $W=0.962$ $df=165$ $p<0.001$).

Therefore outcome measures for anxiety (HADSA), depression (HADSD), psychological distress (HADS-T) and health related quality of life (SIBDQ) assessed at baseline (Time 1) and 3 month follow up (Time 2) were dichotomised as the distribution of data for these continuous variables fell into

two clear groupings. Logistic regression was selected as the method of analysis to estimate associations between potential predictor variables measured at baseline (Time 1) and probable cases of anxiety, depression, distress and poor health related quality of life assessed at baseline (Time 1) and 3 month follow up (Time 2). Logistic regression generates odds ratios which describe the increase or decrease in the odds of being in one outcome category when the value of the independent variable increases by one unit. It also allows for the impact of covariate or confounding variables to be determined (Tabachnik & Fidell, 2001).

Participants were classified as a moderate case of anxiety and/or depression at baseline (Time 1) and 3 month follow up (Time 2) if they scored 11 or more on the relevant subscale of the hospital anxiety and depression scale and a case of psychological distress was indicated by a HADS total score of 15 or more. A case of poor health related quality of life was categorised by a score of 56 or less on the short inflammatory bowel disease questionnaire (SIBDQ). Potential predictor variables were entered into the analysis as continuous data as logistic regression does not assume independent variables are normally distributed (Acock et al, 2016).

Correlation analysis was utilised to explore the relationship between psychological measures assessed at baseline (Time 1) in this study. Pearson's correlation coefficient and p values indicated that these measures were highly and statistically significantly correlated with each other (Table 5.1). Time 1 assessments of anxiety, depression (HADS) and health related quality of life

(SIBDQ) were included in this analysis as continuous data as they were to be entered into the prospective analysis as potential predictor variables.

Table 5.1: Correlations between psychological measures assessed at baseline (Time 1)

	T1 HADSA	T1 HADSD	T1 SIBDQ	BES	CPAQ	IBS-BRQ	CBSQ: FA	CBSQ: D	CBSQ: SF	CSBQ: R	CBSQ: AL	CBSQ: EA
T1 HADSA	1.0											
T1 HADSD	0.65 p<0.0001	1.0										
T1 SIBDQ	-0.56 p<0.0001	-0.65 P<0.0001	1.0									
BES	0.49 p<0.0001	0.37 p<0.0001	-0.33 p<0.0001	1.00								
CPAQ	-0.59 p<0.0001	-0.64 p<0.0001	0.57 p<0.0001	-0.39 p<0.0001	1.00							
IBS-BRQ	0.41 p<0.0001	0.44 p<0.0001	-0.51 p<0.0001	0.23 p<0.001	-0.40 p<0.0001	1.00						
CBRQ: FA	0.26 p<0.0002	0.40 p<0.0001	-0.44 p<0.0001	0.10 p=0.16	-0.49 p<0.0001	0.31 p<0.0001	1.00					
CBRQ: D	0.28 p=0.0001	0.19 p<0.007	-0.28 p=0.0001	0.17 p=0.02	-0.42 p<0.0001	0.23 p= 0.001	0.35 p<.0001	1.00				
CBRQ: SF	0.54 p<0.0001	0.35 p<0.0001	-0.43 p<0.0001	0.31 p<0.0001	-0.59 p<0.0001	0.34 p<0.0001	0.29 p<0.0001	0.48 p<0.0001	1.00			
CBRQ: R	0.49 p<0.0001	0.45 p<0.0001	-0.50 p<0.0001	0.26 p<0.0001	-0.65 p<0.0001	0.40 p<0.0001	0.54 p<0.0001	0.40 p<0.0001	0.45 p<0.0001	1.00		
CBRQ: AL	0.45 p<0.0001	0.36 p<0.0001	-0.48 p<0.0001	0.32 p<0.0001	-0.42 p<0.0001	0.38 p<0.0001	0.27 p=0.0001	0.32 p<0.0001	0.38 p<0.0001	0.59 p<0.0001	1.00	
CBRQ: EA	0.50 p<0.0001	0.40 p<0.0001	-0.56 p<0.0001	0.42 p<0.0001	-0.58 p<0.0001	0.48 p<0.0001	0.35 p<0.0001	0.31 p<0.0001	0.54 p<0.0001	0.45 p<0.0001	0.39 p<0.0001	1.00

Key :T1 HADSA: Time 1 hospital anxiety and depression scale: anxiety, **T1 HADSD**: Time 1 hospital anxiety and depression scale: depression, **T1SIBDQ**: Time 1 Short Inflammatory bowel disease questionnaire, **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBSBRQ**: irritable bowel syndrome behavioural response questionnaire, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance, **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance

Multicolinearity arises from highly correlated predictor variables and can lead to unstable estimates of odds ratios in multivariable logistic regression analysis. In addition it can lead to inaccurate results about which predictors are redundant in the presence of others. This can be a challenge for psychological research as there is often some conceptual overlap between differing measures of psychological constructs. Variable selection or reduction techniques are often used to overcome this problem but these strategies to assess variable importance are also influenced by multicollinearity. Optimal variable selection is therefore difficult in standard logistic regression modelling where predictor variables are highly and statistically significantly correlated (Midi et al, 2010). Consequently in this study psychological measures showing statistically significant associations with adjustment outcomes were not entered collectively into a multivariable model.

For the cross sectional analysis and prospective analysis, univariable analysis was performed to assess the associations between sociodemographic, disease related and clinical variables assessed at baseline (Time 1) and each outcome assessed at baseline (Time 1) (anxiety, depression, distress, poor health related quality of life) and at 3 month follow up (Time 2). Potential psychological predictor variables assessed at baseline (Time 1) were also tested one by one with each outcome assessed at baseline (Time 1) and 3 month follow up (Time 2) and then adjusted for each sociodemographic, disease related or clinical factor (such as age or level of symptomatic disease activity) which showed a statistically significant association with that outcome (equal to or less than 0.10). This significance level was chosen as more traditional levels such as 0.05 can fail in identifying variables known to be important (Bursac et al, 2008).

In addition, descriptive statistics were generated to analyse baseline characteristics of study participants at Time 1. Chi –squared tests were performed to assess for any statistically significant differences between participants with ulcerative colitis or Crohn's disease on baseline data. For continuous psychological measures with a skewed distribution the two sample Wilcoxon rank sum (Mann Whitney) test was used to test for significant differences between the two types of IBD. The two sample t tests were performed for variables that were normally distributed.

For the prospective analysis, descriptive statistics were generated to analyse baseline characteristics of study completers (completed measures at baseline & follow up) and non –completers (only completed baseline measures). Chi – squared tests were performed to assess any statistically significant differences between 1) study completers and non-completers and 2) study completers with Crohn's disease and ulcerative colitis on baseline data. For continuous psychological measures with a skewed distribution the two sample Wilcoxon rank sum (Mann Whitney) test was used to test for significant differences between 1) study completers and non-completers and 2) study completers with Crohn's disease and ulcerative colitis. The two sample t tests were performed for variables that were normally distributed. Further, as the number of participants across age bands was unevenly distributed with few aged 18-24 years or over 75 years, the age categories were collapsed into 3 bandings to create more equal groups; under 35 years, 35-54 years, 55 years and over, for both the cross sectional and prospective analysis.

Ethics

This study was approved by the NRES committee London-Bloomsbury (REC reference 12/LO/1510). A copy of the patient information sheet and consent form are provided in appendix 4.

5.4.1: Results: Cross sectional analysis.

Participants

At baseline (Time 1) questionnaires were completed by 222 participants. Table 5.2 reports baseline data on the socio-demographic and clinical characteristics of participants by IBD type (including X2, t-tests statistics, df & p values). The sample was composed of 104 people with ulcerative colitis, of which 73% were female. The majority were British (67%), under 35 years in age (41%), living with their partners (56%), educated to a post graduate level (37%), in paid work (71%), had other health problems alongside their diagnosis of ulcerative colitis (54%) and were reporting symptoms of disease activity indicative of relapse (52.9%). The remaining 118 participants had a diagnosis of Crohn's disease of which 72% were female. The majority of this group were also British (75%), aged between 35-54 years (49%), living alone (51%), educated to a post graduate level (27%) and in paid work (60%). In addition, the majority were experiencing other health problems (61%) as well as Crohn's disease and were reporting symptoms of disease activity indicative of relapse (60.2%). Preliminary analysis identified there were no statistically significant differences between participants with ulcerative colitis and those with Crohn's disease on any sociodemographic or clinical factors.

Table 5.2: Sociodemographic and clinical characteristics of participants by IBD type.

Sociodemographic & Clinical factor	UC	CD	X2, P value & t-tests & df
N=222	104 (46.8%)	118 (53.2%)	
Female: n %	76 (73%)	85 (72%)	Pearson chi2(1) = 0.03 p = 0.86
Marital status: n %			
1=living with partner	58 (56%)	58 (49%)	
2=living alone	46 (44%)	60(51%)	Pearson chi2(4) = 4.52 p = 0.34
Ethnicity :n %			
1=English/Welsh/Scot	70 (67%)	88 (75%)	
2=Mixed multiple	14 (13%)	9 (8%)	
3=Asian /Asian British	8 (8%)	10 (8%)	
4=Black British	12 (12%)	11 (9%)	Pearson chi2(22) = 22.63 p = 0.48
Age: n %			
1=Under 35	43 (41%)	44 (37%)	
2=35-54	38 (36.5%)	58 (49%)	
3=55 and over	23 (22.5%)	16 (13%)	Pearson chi2(6) = 10.01 p = 0.12
Work status: n %			
1=Paid work	74 (71%)	71 (60%)	
2=Not in paid work	30 (29%)	47 (40%)	Pearson chi2(8) = 12.52 p = 0.13
Comorbidity: n %			
1=Yes	56 (54%)	71 (61%)	
2=No	48 (46%)	47 (39%)	Pearson chi2(1) = 1.05 p = 0.31
Source: n %			
1=NHS Clinic	66 (63.5%)	69 (58.5%)	
2=Patient organisation	38 (36.5%)	49 (41.5%)	Pearson chi2(1) = 0.49 p = 0.48
Disease activity: relapse (<3 SCCAI or <5 HBI) n %			
Yes	55 (52.9%)	71 (60.2%)	(Different measures so could not
No	49 (47.1%)	47 (39.8%)	be compared)
Age of diagnosis: M. (SD), (range)	31.03, (12.2), (3-67)	28.9, (13.3), (3-75)	T(218)= 1.21 p = 0.23
Years in education: M, (SD), (range)	16, (4.21), (3-47)	15, (5.83), (3-47)	T(208)= 1.45 p = 0.15

Baseline Scores of psychological variables by IBD type

Comparisons between participants with ulcerative colitis and Crohn's disease on baseline measurements of psychological variables demonstrated some statistically significant differences (Table 5.3). Participants with Crohn's disease had higher mean scores for; symptoms of anxiety (HADSA), unhelpful beliefs about experiencing negative emotions (BeS), resting (CBRQ: R) and all or nothing (CBRQ: AL) behavioural subscales of the cognitive behavioural responses to symptoms questionnaire. Further participants with Crohn's disease had lower scores for health related quality of life (SIBDQ).

Table 5.3: Comparisons between participants with ulcerative colitis and Crohn's disease on baseline measurements of psychological measures (Time 1).

Measures(n=222)	UC: mean (SD) or median (n=104)	CD: mean (SD) or median (n=118)	Two sample t tests & Rank sum stats
T1 HADSA	7.0	9.0	Z=-1.9 p=0.05
T1 HADSD	5.0	6.0	Z=-1.0 p=0.30
T1 SIBDQ	50	44	Z=2.7 p<0.01
BES	35.8 (13.4)	41.4 (15.1)	T(205)=-2.8 p=<0.01
CPAQ	48.39 (14.2)	45.7 (14.6)	T(207)=1.3 p=0.19
IBS-BRQ: A	54.9 (21.3)	52.5 (21.9)	T(202)=0.78 p=0.44
IBS-BRQ: S	51.2 (13.5)	48.4 (14.3)	T(202)=1.43 p=0.15
CBRQ : FA	11 (4.4)	12.1 (4.3)	T(209)=-1.4 p=0.16
CBRQ: D	12.0	13.0	Z=-0.3 p=0.8
CBRQ: SF	14.9 (5.7)	14.6 (5.1)	T(208)=0.4 p=0.69
CBRQ: R	10.0	12.0	Z=-2.4 p=0.02
CBRQ: EA	11.5 (4.9)	12.3 (4.9)	T(210)=-1.1 p=0.28
CBRQ: AL	7.0	10.0	Z=-3.6 p<0.01

Key :T1 HADSA: Time 1 hospital anxiety and depression scale: anxiety, **T1 HADSD**: Time 1 hospital anxiety and depression scale: depression, **T1SIBDQ**: Time 1 Short Inflammatory bowel disease questionnaire, **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour**, S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs, **SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Distribution of cases of anxiety & depression, HRQOL and general psychological distress assessed at baseline (Time 1) by IBD type.

Based on scores on the hospital anxiety and depression scale (Zigmond & Snath, 1983), at baseline (Time 1) 28.8% of participants with ulcerative colitis and 37.3% with Crohn's disease were probable cases of anxiety. 14.4% of participants with ulcerative colitis and 11.9% of participant with Crohn's disease reported scores indicative of probable cases of depression. Based on total HADS scores, 39.4% of participants with ulcerative colitis and 51.3% of those with Crohn's diseases had scores indicative of being a probable case of general psychological distress. Scores for health related quality of life on the Simple inflammatory bowel disease questionnaire (SIBDQ) (Irvine, 1989) at baseline suggest that 67.3% of participants with ulcerative colitis and 75.4% of participants with Crohn's disease were cases of poor quality of life (Table 5.4). These differences in the distribution of cases of anxiety, depression, psychological distress and poor health related quality of life between the IBD types were not statistically significant.

Table 5.4: Time 1 cases of anxiety, depression, psychological distress and health related quality of life by disease type.

N=222	UC	CD	X2 & p value
n (%) cases of Anxiety (scoring 11 or over on HADSA)			
Yes	30 (28.8%)	44 (37.3%)	
No	74 (71.2%)	74 (62.7%)	Pearson chi2(1) = 2.61 p = 0.11
n (%) cases of depression (scoring 11 or over on HADSD)			
Yes	15 (14.4%)	14 (11.9%)	
No	89 (85.6%)	104 (88.1%)	Pearson chi2(1) = 0.18 p = 0.67
n (%) Cases of general psychological distress (scoring > 15 on HADST)			
Yes	41 (39.4%)	56 (51.3%)	
No	60 (57.6%)	53 (48.7%)	Pearson chi2(1) = 2.45 p = 0.12
n (%) Cases of poor quality of life (scoring 56 or less SIBDQ)			
Yes	70 (67.3%)	89 (75.4%)	
No	34 (32.7%)	29 (24.6%)	Pearson chi2(1) = 1.79 p = 0.18

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of anxiety at baseline (Time 1).

Based on the univariable analysis (Table 5.5) sociodemographic and clinical variables assessed at baseline (Time 1) significantly associated with cases of anxiety at baseline (Time 1) were gender, age, years in education and symptomatic disease activity in ulcerative colitis and Crohn's disease.

Table 5.5: Univariable analysis: Sociodemographic & disease related & clinical factors assessed at time 1 associated with time 1 cases of moderate anxiety (=>11 on HADSA).

Socio- demographic & clinical variables.	Non-Cases	Cases	Unadjusted odds ratio, (95% CI) and p value
Gender: 1=Female	93	58	
2=Male	43	16	0.61 (0.31 -1.16) p = 0.01
Age: 1=Under 35 yrs.	47	35	
2=35-55 yrs.	59	31	0.71 (0.38- 1.31) p = 0.27
3= 55 yrs and over	30	8	0.36 (0.15- 0.88) p = 0.02
Marital status: 1=Living with partner	72	38	0.94 (0.53- 1.65) p = 0.83
0=Living alone	64	36	
Ethnicity: 1=English/ Welsh/ Scottish/ Northern Irish	78	25	
2=Mixed/multiple	3	8	6.24 (0 .54- 1.76) p = 0.14
3=Asian/Asian British	4	3	2.34 (0.49 -11.17) p = 0.29
4= Black British	7	4	1.78 (0.48- 6.60) p = 0.39
Comorbidity: 1=Yes	75	43	
0=No	61	31	1.13 (0.64- 1.10) p = 0.68

Clinical & sociodemographic factors (continuous data)	Mean & (SD)	Unadjusted odds ratio, (95% CI) and p value
Disease activity : Ulcerative colitis	4.6 (3.6)	1.35 (1.17- 1.57) p = 0.01
Disease activity : Crohn's disease	6.9 (4.5)	1.08 (0 .99- 1.18) p = 0.09
Age of Diagnosis	29.9 (12.8)	1.01 (0.98- 1.03) p = 0.84
Years in education	15.4 (5.2)	0.93 (0.87 -0.99) p = 0.02

Univariable analysis identified statistically significant associations between all psychological measures assessed at baseline (Time 1) and cases of anxiety at baseline (Time 1) when unadjusted for sociodemographic or clinical variables (Table 5.6). Adjusting for age, gender or years in education had little impact on the majority of these relationships except for beliefs about emotions (BeS). After adjusting for years spent in education, unhelpful beliefs about experiencing and expressing negative emotions (BeS) were associated with reduced odds of being a case of anxiety at baseline (Time 1).

Adjusting for symptomatic disease activity reduced or eliminated some relationships, particularly for participants with CD. For the CD group, after adjusting for disease activity, time 1 cases of anxiety were associated with unhelpful beliefs about experiencing and expressing negative emotions (BeS), a lack of acceptance beliefs towards symptoms (CPAQ), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ: A, IBS-BRQ: S), symptom focusing (CBRQ: SF), resting behaviour (CBRQ: R), all or nothing behaviour (CBRQ: AL), as well as embarrassment avoidance beliefs (CBRQ: EA). For the UC group, after adjusting for disease activity, time 1 cases of anxiety were associated with unhelpful beliefs about experiencing and expressing negative emotions (BeS), a lack of acceptance beliefs towards symptoms (CPAQ), avoidant behavioural responses to gastrointestinal symptoms (IBS-BRQ: A), damage beliefs (CBRQ; D), symptom focusing beliefs (CBRQ: SF), resting behaviour (CBRQ: R), all or nothing behaviour (CBRQ: AL), and embarrassment avoidance beliefs (CBRQ: EA).

Each psychological factor was then entered on its own into a multivariable model with all statistically significant sociodemographic, disease related and

clinical variables (gender, age, years in education and disease activity) to further test associations with time 1 cases of anxiety. For the UC group, the significant associations did not change (Table 5.7). For the CD group the relationship between resting behaviour, safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ; S) and time 1 cases of anxiety were no longer significant whilst all other associations remained largely unchanged (Table 5.8).

Table 5.6: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 1 cases of moderate anxiety (= >11 on HADSA) unadjusted and adjusted.

Psychological Variables:	Unadjusted odds ratio p value and (95% CI) (Whole sample n=222)	Adjusted for gender (Whole sample n=222)	Adjusted for age (Whole sample n=222)	Adjusted for years in education (Whole sample n=222)	Adjusted for disease activity UC (UC group only n=104))	Adjusted for disease activity CD (CD group only n=118)
BeS	1.06 (1.03-1.08) p<0.01	1.06 (1.04-1.08) p<0.01	1.06 (1.03-1.08) p<0.01	0.93 (0.87-0 .99) p=0.02	1.07 (1.02-1.11) p<0.01	1.05 (1.02-1.08) p<0.01
CPAQ	0.91 (0.88-0.94) p<0.01	0.91 (0.88-0.94) p<0.01	0.91 (0.88-0.94) p<0.01	0.91 (0.88-0.94) p<0.01	0.83 (0.76-0.91) p<0.01	0.94 (0.91-0.97) p<0.01
IBS-BRQ: A	1.04 (1.02-1.05) p<0.001	1.04 (1.02-1.05) p<0.001	1.04 (1.02-1.05) p<0.001	1.04 (1.02-1.05) p<0.001	1.03 (1.01-1.05) p=0.03	1.03 (1.02-1.06) p<0.001
IBS-BRQ: S	1.05 (1.02-1.07) p<0.001	1.05 (1.02-1.07) p<0.001	1.05 (1.02-1.07) p<0.001	1.05 (1.02-1.07) p<0.001	1.04 (0.99-1.09) p<0.08	1.04 (1.01-1.07) p<0.01
CBRQ: FA	1.13 (1.04-1.22) p<0.01	1.13 (1.04-1.22) p<0.01	1.11 (1.02-1.21) p=0.02	1.13 (1.04-1.24) p<0.01	1.13 (0.97-1.31) p=0.12	1.04 (0.93-1.16) p=0.54
CBRQ: D	1.17 (1.05-1.30) p<0.01	1.18 (1.07-1.32) p<0.01	1.15 (1.03-1.87) p<0.01	1.16 (1.04-1.29) p=0.01	1.25 (1.04-1.50) p=0.02	1.06 (0.91-1.22) p=0.45
CBRQ: SF	1.24 (1.15-1.33) p<0.01	1.25 (1.16-1.34) p<0.01	1.24 (1.15-1.33) p<0.01	1.24 (1.15-1.33) p<0.01	1.31 (1.14-1.51) p<0.01	1.19 (1.08-1.31) p<0.01
CBRQ: R	1.15 (1.09-1.21) p<0.01	1.15 (1.09-1.21) p<0.01	1.14 (1.08-1.20) p<0.01	1.15 (1.09-1.21) p<0.01	1.20 (1.08-1.33) p=0.01	1.07 (1.01-1.15) p=0.04
CBRQ: AL	1.17 (1.10-1.25) p<0.01	1.17 (1.09-1.25) p<0.01	1.16 (1.09-1.24) p<0.01	1.17 (1.09-1.25) p<0.01	1.12 (1.01-1.25) p=0.03	1.16 (1.05-1.28) p=0.01
CBRQ: EA	1.24 (1.15-1.34) p<0.01	1.24 (1.15-1.34) p<0.01	1.24 (1.15-1.34) p<0.01	1.23 (1.13-1.33) p<0.01	1.22 (1.07-1.40) p<0.01	1.19 (1.07-1.33) p<0.01

Key: **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Table 5.7: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 1 cases of moderate anxiety (=>11 on HADSA) on its own in a gender, age, years in education and symptomatic disease activity adjusted model (UC).

Psychological predictor variable	Odds ratio, (confidence interval) & p value for each psychological factor in its own gender, age, years in education, disease activity (UC) adjusted model.
BeS	1.08 (1.03-1.13) p<0.01
CPAQ	0.76 (0.66-0.87) p<0.001
IBS-BRQ: A	1.03 (1.01-1.05) p=0.04
IBS-BRQ: S	1.04 (0.99-1.09) p=0.08
CBRQ: Fear avoidance	1.14 (0.97-1.34) p=0.13
CBRQ: Damage beliefs	1.25 (1.02-1.52) p=0.03
CBRQ: Symptom focusing	1.34 (1.14-1.57) p<0.001
CBRQ: Resting	1.24 (1.09-1.41) p<0.001
CBRQ: All or nothing	1.14 (1.01-1.30) p=0.04
CBRQ: Embarrassment avoidance	1.21 (1.06-1.38) p<0.01

Table 5.8: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 1 cases of moderate anxiety (=>11 HADSA) on its own in a gender, age, years in education and symptomatic disease activity adjusted model (CD).

Psychological predictor variable	Odds ratio, (confidence interval) & p value for each psychological factor in its own gender, age, years in education, disease activity (CD) adjusted model
BeS	1.06 (1.02-1.10) p<0.01
CPAQ	0.95 (0.92-0.99) p=0.02
IBS-BRQ: A	1.03 (1.01-1.05) p=0.03
IBS-BRQ: S	1.03 (0.99-1.07) p=0.08
CBRQ: Fear avoidance	0.99 (0.87-1.13) p=0.93
CBRQ: Damage beliefs	0.99 (0.82-1.19) p=0.89
CBRQ: Symptom focusing	1.19 (1.07-1.33) p<0.01
CBRQ: Resting	1.04 (0.96-1.12) p=0.37
CBRQ: All or nothing	1.16 (1.03-1.31) p=0.01
CBRQ: Embarrassment avoidance	1.17 (1.04-1.31) p=0.01

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of depression at baseline (Time 1)

Based on the univariable analysis (Table 5.9) there were no sociodemographic or clinical variables assessed at baseline (Time 1) which were significantly associated with cases of depression at baseline (Time 1). Measures of symptomatic disease activity for ulcerative colitis and Crohn's disease were significantly associated with this outcome.

Table 5.9: Univariable analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 1 cases of moderate depression (=>11 HADSD).

Sociodemographic & clinical variables	Non cases	Cases	Unadjusted odds ratio, (95% CI) and p value
Gender: 0=Female	128	23	
1=Male	54	6	0.63 (0.24-1.64) p=0.34
Age: 1=Under 35 yrs.	69	13	
2=35-55 yrs.	79	11	0.74 (0.31-1.76) p=0.49
3= 55 yrs. and over	33	5	0.80 (0.27-2.44) p=0.70
Marital status: Living with partner =1	98	12	
Living alone =0	83	17	0.60 (0.27-1.32) p=0.21
Ethnicity: 1=English / Welsh / Scottish	94	9	
2=Mixed/multiple	8	2	5.22 (0.43-63.3) p=0.19
3=Asian/Asian British	11	0	1.12 (0.49-11.17) p=0.29
4= Black British	6	0	1.03 (0.48-6.60) p=0.39
Comorbidity: 1=Yes	98	20	
0=No	83	9	1.88 (0.81-4.36) p=0.14

Clinical factors (continuous data)	Mean & (SD)		Unadjusted odds ratio, (95% CI) and p value
Disease activity: Ulcerative colitis	4.64	(3.6)	1.46 (1.20-1.77) p<0.001
Disease activity: Crohn's disease	6.98	(4.5)	1.21 (1.06-1.37) p<0.01
Age of Diagnosis	29.92	(12.8)	1.02 (0.99-1.05) p=0.27
Years in education	15.4	(5.2)	0.94 (0.87-1.03) p=0.18

Univariable analysis found statistically significant associations between all psychological variables assessed at baseline (Time 1) and baseline (Time 1) cases of depression when unadjusted for symptomatic disease activity (Table 5.10). After adjusting for symptomatic disease activity in the UC group, time 1 cases of depression were associated with unhelpful beliefs about experiencing and expressing negative emotions (BeS), a lack of acceptance beliefs towards symptoms (CPAQ) and resting behaviour (CBRQ: R). For the CD group after adjusting for disease activity, time 1 cases of depression were associated with a lack of acceptance beliefs towards symptoms (CPAQ), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ: A, IBS-BRQ:S), symptom focusing (CBRQ: SF), resting behaviour (CBRQ: R) and embarrassment avoidance beliefs (CBRQ: EA). Individual psychological factors were not tested further in separate multivariable models as there were no additional significantly associated sociodemographic or clinical variables to collectively include in the analysis.

Table 5.10: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 1 cases of moderate depression (=>11 HADSD) unadjusted and adjusted.

Psychological Variables:	Unadjusted odds ratio p value and (95% CI) (Whole sample n=222)	Adjusted for disease activity UC (UC group only n=104))	Adjusted for disease activity CD (CD group only n=118)
BeS	1.05 (1.02-1.09) p<0.01	1.08 (1.02-1.14) p=0.01	1.03 (0.99-1.07) p=0.21
CPAQ	0.89 (0.85-0.925) p<0.001	0.87 (0.80-0.95) p=0.002	0.89 (0.84-0.95) p=0.001
IBS-BRQ: A	1.04 (1.02-1.06) p<0.001	1.02 (0.99-1.05) p=0.14	1.05 (1.02-1.08) p=0.001
IBS-BRQ: S	1.08 (1.04-1.12) p<0.001	1.03 (0.97-1.10) p=0.30	1.17 (1.03-1.13) p<0.01
CBSQ: FA	1.22 (1.08-1.40) p<0.01	1.05 (0.86-1.29) p=0.61	1.21 (0.99-1.48) p=0.07
CBRQ: D	1.19 (1.03-1.37) p=0.02	1.16 (0.91-1.47) p=0.23	1.12 (0.89-1.40) p=0.32
CBRQ: SF	1.18 (1.08-1.29) p<0.001	1.06 (0.92-1.22) p=0.42	1.22 (1.05-1.41) p<0.01
CBRQ: R	1.17 (1.09-1.24) p<0.001	1.14 (1.03-1.27) p=0.02	1.11 (1.01-1.22) p=0.03
CBRQ: AL	1.18 (1.08-1.28) p<0.001	1.12 (0.99-1.28) p=0.08	1.09 (0.95-1.26) p=0.22
CBRQ: EA	1.24 (1.12-1.38) p<0.001	1.08 (0.92-1.26) p=0.35	1.27 (1.06-1.52) p<0.01

Key: **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, AL: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of general psychological distress at baseline (Time 1)

Univariable analysis (Table 5.11) identified age, years in education, comorbidity and symptomatic disease activity for both UC and CD assessed at baseline (Time 1) were significantly associated with cases of psychological distress at baseline (Time 1).

Univariable analysis found statistically significant associations between all psychological variables assessed at time 1 and time 1 cases of psychological distress when unadjusted for sociodemographic, clinical or disease related variables (Table 5.12). Adjusting for age, years in education or comorbidity had minimal impact on these relationships except for safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ: S). After adjusting for years in education, unhelpful safety seeking behaviour reduced the odds of being a time 1 case of distress.

Table 5.11: Univariable analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 1 cases of distress (=>15 HADST).

Socio- demographic & clinical variables.	Non cases	Cases	Unadjusted odds ratio, (95% CI) and p value
Gender:0=Female	80	71	
1=Male	33	26	0.89 (0.49-1.63) p=0.7
Age: 1=Under 35 yrs.	40	42	
2=35-55 yrs.	48	42	0.83 (0.46-1.52) p=0.55
3= 55 yrs. and over	25	13	0.49 (0.22-1.10) p=0.08
Marital status: Living with partner =1	63	47	
Living alone =0	50	50	0.75 (0.43-1.29) p=0.29
Ethnicity: 1=English / Welsh / Scottish	66	37	
2=Mixed/multiple	2	8	1.78 (0.48-6.60) p=0.39
3=Asian/Asian British	4	3	1.34 (0.28-6.30) p=0.71
4= Black British	5	6	2.14 (0.61-7.50) p=0.23
Comorbidity: 1=Yes	57	61	
0=No	56	36	1.66 (0.96-2.89) p=0.07

Clinical factors (continuous data)	Mean & (SD)	Unadjusted odds ratio, (95% CI) and p value
Disease activity : Ulcerative colitis	4.64 (3.63)	1.38 (1.20-1.61) p<0.001
Disease activity : Crohn's disease	6.98 (4.45)	1.09 (0.099-1.19) p=0.06
Age of Diagnosis	29.92 (12.81)	1.01 (0.99-1.03) p=0.29
Years in education	15.4 (5.16)	0.92 (0.86-0.98) p=0.01

For the UC group, after adjusting for symptomatic disease activity, time 1 cases of general distress were associated with unhelpful beliefs about emotions (BeS), lack of acceptance beliefs towards symptoms (CPAQ), avoidant behavioural responses to gastrointestinal symptoms (IBS-BRQ: A), Symptom focusing (CBRQ; SF), resting behaviour (CBRQ: R) and all or nothing behaviour (CBRQ: AL). For the CD group, time 1 cases of general distress were associated with unhelpful beliefs about experiencing and expressing negative emotions (BeS), lack of acceptance beliefs towards symptoms (CPAQ), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ), symptom focusing (CBRQ: SF), resting behaviour (CBRQ: R) and embarrassment avoidance beliefs (CBRQ: EA).

Table 5.12: Univariate and multivariate analysis: Psychological variables assessed at time 1 associated with time 1 cases of distress (=>15 HADST), unadjusted and adjusted.

Psychological Variables:	Unadjusted odds ratio p value and (95% CI) (Whole sample n=222)	Adjusted for age (Whole sample n=222)	Adjusted for years in education (Whole sample n=222)	Adjusted for Comorbidity (Whole sample n=222)	Adjusted for disease activity UC (UC group only n=104))	Adjusted for disease activity CD (CD group only n=118)
BeS	1.07 (1.04-1.09) p<0.001	1.06 (1.04-1.09) p<0.001	1.07 (1.04-1.09) p<0.001	1.06 (1.04-1.09) p<0.001	1.07 (1.03-1.12) p<0.01	1.06 (1.03-1.10) p<0.001
CPAQ	0.87 (0.84-0.90) p<0.001	0.87 (0.84-0.91) p<0.001	0.88 (0.85-0.92) p<0.001	0.88 (0.84-0.91) p<0.001	0.83 (0.76-0.91) p<0.001	0.90 (0.86-0.94) p<0.001
IBS-BRQ: A	1.03 (1.02-1.05) p<0.001	1.03 (1.02-1.05) p<0.001	1.03 (1.02-1.05) p<0.001	1.03 (1.02-1.05) p<0.001	1.03 (1.01-1.05) p=0.05	1.03 (1.01-1.05) p<0.01
IBS-BRQ: S	1.04 (1.03-1.07) p<0.001	1.05 (1.02-1.07) p<0.001	0.92 (0.86-0.98) p<0.001	1.05 (1.02-1.07) p<0.001	1.04 (0.99-1.08) p=0.07	1.03 (1.01-1.08) p<0.01
CBRQ: FA	1.15 (1.06-1.25) p<0.01	1.14 (1.05-1.24) p=0.001	1.15 (1.05-1.25) p=0.002	1.14 (1.05-1.24) p=0.001	1.13 (0.98-1.31) p=0.09	1.07 (0.96-1.20) p=0.2
CBRQ: D	1.11 (1.01-1.22) p=0.03	1.10 (1.00-1.21) p=0.050	1.11 (1.01-1.23) p=0.029	1.11 (1.01-1.23) p=0.024	1.08 (0.93-1.26) p=0.29	1.05 (0.91-1.21) p=0.53
CBRQ: SF	1.24 (1.15-1.33) p<0.001	1.23 (1.15-1.32) p<0.001	1.23 (1.15-1.32) p<0.001	1.25 (1.16-1.34) p<0.001	1.21 (1.08-1.35) p=0.001	1.24 (1.12-1.37) p<0.001
CBRQ: R	1.16 (1.10-1.22) p<0.001	1.15 (1.09-1.22) p<0.001	1.16 (1.09-1.22) p<0.001	1.15 (1.09-1.22) p<0.001	1.19 (1.08-1.32) p=0.001	1.09 (1.01-1.17) p=0.02
CBRQ: AL	1.15 (1.08-1.22) p<0.001	1.15 (1.08-1.22) p<0.001	1.15 (1.07-1.22) p<0.001	1.15 (1.08-1.22) p<0.001	1.15 (1.03-1.28) p=0.01	1.09 (0.99-1.20) p=0.07
CBRQ: EA	1.20 (1.12-1.29) p<0.001	1.20 (1.12-1.29) p<0.001	1.19 (1.10-1.27) p<0.001	1.20 (1.12- 1.28) p<0.001	1.08 (0.97-1.20) p=0.16	1.21 (1.10- 1.36) p<0.001

Key: **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **: S** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, **AL** : all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Each psychological factor was then entered on its own in a multivariable model with all statistically significant sociodemographic, clinical and disease related variables (age, years in education, comorbidity and disease activity) to further test associations with time 1 cases of general distress. For the UC group the relationship between avoidant behavioural responses to gastrointestinal symptoms and distress was no longer significant (Table 5.13). For the CD group the relationship between resting behaviour and Time 1 cases of distress was no longer significant. All other associations remained largely unchanged (Table 5.14).

Table 5.13: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 1 cases of distress (=>15 HADST) on its own in an age, years in education, comorbidity and symptomatic disease activity adjusted model (UC).

Psychological predictor variable	Odds ratio, (confidence interval) & p value for each psychological factor in its own gender, age, years in education, disease activity (UC) adjusted model.
BeS	1.08 (1.03-1.14) p<0.001
CPAQ	0.83 (0.75-0.91) p<0.001
IBS-BRQ: A	1.03 (0.99-1.05) p=0.07
IBS-BRQ: S	1.03 (0.98-1.09) p=0.18
CBRQ: Fear avoidance	1.14 (0.98-1.34) p=0.09
CBRQ: Damage beliefs	1.10 (0.93-1.29) p=0.26
CBRQ: Symptom focusing	1.21 (1.08-1.36) p<0.001
CBRQ: Resting	1.22 (1.08-1.37) p<0.001
CBRQ: All or nothing	1.16 (1.02-1.32) p=0.02
CBRQ: Embarrassment avoidance	1.08 (0.97-1.20) p=0.17

Table 5.14: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 1 cases of distress (=>15 HADST) on its own in an age, years in education, comorbidity and symptomatic disease activity adjusted model (CD).

Psychological predictor variable	Odds ratio, (confidence interval) & p value for each psychological factor in its own gender, age, years in education, disease activity (CD) adjusted model.
BeS	1.07 (1.03-1.11) p<0.001
CPAQ	0.92 (0.88-0.96) p<0.001
IBS-BRQ: A	1.02 (1.01-1.04) p=0.04
IBS-BRQ: S	1.04 (1.00-1.07) p=0.05
CBRQ: Fear avoidance	0.99 (0.87-1.15) p=0.91
CBRQ: Damage beliefs	0.97 (0.82-1.14) p=0.67
CBRQ: Symptom focusing	1.23 (1.11-1.37) p<0.001
CBRQ: Resting	1.06 (0.97-1.14) p=0.21
CBRQ: All or nothing	1.09 (0.98-1.21) p=0.09
CBRQ: Embarrassment avoidance	1.18 (1.05-1.32) p<0.01

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of poor health related quality of life at baseline (Time 1)

Univariate analysis found no statistically significant relationships between any sociodemographic variables assessed at baseline and cases of poor health related quality of life at baseline (Time 1). Clinical and disease related factors linked to baseline (Time 1) cases of poor quality of life included having a comorbid health problem alongside the diagnosis of IBD and symptomatic disease activity for both ulcerative colitis and Crohn's disease (Table 5.15).

Table 5.15: Univariable analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 1 cases of poor health related quality of life (=<56 SIBDQ).

Socio- demographic & clinical variables.	Non cases	Cases	Unadjusted odds ratio,(95% CI) and p value
Gender :0=Female	51	114	
1=Male	17	45	1.18 (0 .62-2.26) p=0.61
Age: 1=Under 35 yrs.	23	65	
2=35-55 yrs.	28	71	0 .91(0.47-1.71) p=0.74
3= 55 yrs. and over	17	23	0.48 (0.22-1.05) p=0.67
Marital status: 1=Living with partner	31	85	
0=Living alone	37	74	1.37 (0.78-2.42) p=0.28
Ethnicity: 1=English / Welsh / Scottish	45	66	
2=Mixed/multiple	0	10	1.01 (0.43-63.3) p=0.19
3=Asian/Asian British	2	5	1.70 (0.32-9.17) p=0.54
4= Black British	4	11	1.87 (0.56-6.25) p=0.31
Comorbidity: 1=Yes	29	98	
0=No	33	61	1.83 (1.01- 3.31) p=0.05
Sociodemographic & Clinical factors (continuous data)	Mean & (SD)		Unadjusted odds ratio, (95% CI) and p value
Disease activity : Ulcerative colitis	4.64	(3.63)	1.37 (1.16-1.62) p<0.001
Disease activity : Crohn's disease	6.98	(4.45)	1.33 (1.15-1.54) p<0.001
Age of Diagnosis	29.92	(12.81)	1.01 (0.98-1.03) p=0.86
Years in education	15.4	(5.16)	0.98 (0.93-1.04) p=0.49

At a univariate level all psychological variables when unadjusted for clinical and disease related factors showed statistically significant relationships with time 1 cases of poor quality of life (Table 5.16). Adjusting for comorbidity had no impact on these relationships but adjusting for symptomatic disease activity reduced or eliminated some of these associations. In the UC group, after adjusting for symptomatic disease activity time 1 cases of poor health related quality of life were significantly associated with lack of acceptance of symptoms (CPAQ) and symptom focusing (CBSQ: SF). For the CD group after adjusting for symptomatic disease activity time 1 cases of poor health related quality of life showed statistically significant relationships with a lack of acceptance beliefs towards symptoms, safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ), resting behaviour (CBSQ: AR) and embarrassment avoidance beliefs (CBSQ: EA).

Table 5.16: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 1 cases of poor health related quality of life (=<56 SIBDQ), unadjusted and adjusted.

Psychological Variables:	Unadjusted odds ratio p value and (95% CI) (Whole sample n=222)	Adjusted for Comorbidity (Whole group n=222)	Adjusted for disease activity UC (UC group only n=104))	Adjusted for disease activity CD (CD group only n=118)
BeS	1.04 (1.02-1.07) p<0.001	1.04 (1.02-1.07) p<0.001	1.01 (0.97-1.05) p=0.61	1.04 (0.99-1.10) p=0.07
CPAQ	0.92 (0.91-0.95) p<0.001	0.93 (0.91-0.95) p<0.001	0.93 (0.89-0.98) p<0.01	0.94 (0.89-0.98) p=0.01
IBS-BRQ: A	1.04 (1.02-1.06) p<0.001	1.04 (1.02-1.06) p<0.001	1.03 (0.99-1.06) p=0.08	1.02 (0.99-1.05) p=0.16
IBS-BRQ: S	1.06 (1.03-1.09) p<0.001	1.06 (1.03-1.09) P<0.001	1.04 (0.99-1.08) p=0.06	1.04 (1.02-1.13) p=0.01
CBRQ: FA	1.18 (1.08-1.29) p<0.001	1.17 (1.07-1.28) p=0.001	1.10 (0.95-1.27) p=0.20	1.11 (0.96-1.28) p=0.16
CBRQ: D	1.13 (1.02-1.30) p=0.020	1.13 (1.02-1.26) p=0.020	1.08 (0.94-1.24) p=0.30	1.10 (0.91-1.32) p=0.32
CBRQ: SF	1.13 (1.06-1.20) p<0.001	1.14 (1.07-1.21) p<0.001	1.14 (1.03-1.25) p<0.01	1.07 (0.97-1.19) p=0.18
CBRQ: R	1.14 (1.07-1.22) p<0.001	1.14 (1.07-1.21) p<0.001	1.05 (0.96-1.15) p=0.29	1.13 (1.01-1.25) p=0.03
CBRQ: AL	1.14 (1.07-1.22) p<0.001	1.14 (1.06-1.22) p<0.001	1.06 (0.95-1.19) p=0.32	1.05 (0.94-1.19) p=0.40
CBRQ: EA	1.23 (1.14-1.32) p<0.001	1.22 (1.13-1.32) p<0.001	1.10 (0.98-1.22) p=0.10	1.21 (1.06-1.38) p<0.01

Key: **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs**, SF:** symptom focusing, R**:** resting behaviour, AL: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Each psychological factor was then entered on its own in a multivariable model with all statistically significant sociodemographic, clinical and disease related variables (comorbidity and disease activity) to further test associations with time 1 cases of poor quality of life. For both groups, the significant associations between psychological factors and baseline health related quality of life did not change (Table 5.17 & 5.18).

Table 5.17: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 1 cases of poor health related quality of life (=<56 SIBDQ) on its own in a comorbidity and symptomatic disease activity adjusted model (UC).

Psychological predictor variable	Odds ratio, (confidence interval) & p value for each psychological factor in its own comorbidity & disease activity (UC) adjusted model.
BeS	1.01 (0.97-1.05) p=0.61
CPAQ	0.93 (0.89-0.98) p<0.01
IBS-BRQ: A	1.02 (0.99-1.05) p=0.10
IBS-BRQ: S	1.04 (0.99-1.09) p=0.07
CBRQ: Fear avoidance	1.09 (0.95-1.26) p=0.22
CBRQ: Damage beliefs	1.09 (0.94-1.25) p=0.25
CBRQ: Symptom focusing	1.15 (1.04-1.27) p<0.01
CBRQ: Resting	1.05 (0.96-1.15) p=0.29
CBRQ: All or nothing	1.06 (0.95-1.19) p=0.32
CBRQ: Embarrassment avoidance	1.10 (0.98-1.23) p=0.09

Table 5.18: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 1 cases of poor health related quality of life (=<56 SIBDQ) on its own in a comorbidity and symptomatic disease activity adjusted model (CD).

Psychological predictor variable	Odds ratio, (confidence interval) & p value for each psychological factor in its own comorbidity & disease activity (CD) adjusted model.
BeS	1.04 (0.99-1.09) p=0.13
CPAQ	0.95 (0.90-0.99) p=0.02
IBS-BRQ: A	1.02 (1.99-1.05) p=0.016
IBS-BRQ: S	1.07 (1.02-1.13) p=0.01
CBRQ: Fear avoidance	1.10 (0.95-1.27) p=0.20
CBRQ: Damage beliefs	1.10 (0.92-1.32) p=0.30
CBRQ: Symptom focusing	1.07 (0.97-1.19) p=0.17
CBRQ: Resting	1.12 (1.01-1.25) p<0.01
CBRQ: All or nothing	1.06 (0.94-1.19) p=0.36
CBRQ: Embarrassment avoidance	1.21 (1.06-1.38) p<0.01

5.4.2: Results: Prospective analysis

Baseline comparisons of characteristics for study completers (Time 1 & Time 2 measures) and non –completers (Time 1 measures only).

The baseline questionnaires were completed by 222 participants with IBD, of which 170 completed the follow up questionnaires at 3 month follow up (response rate 76.6%). Table 6.9 reports baseline data on socio-demographic, clinical and psychological variables for participants who completed time 1 & 2 measures (study completers) and those who completed time 1 measures only (non- completers). There were no relevant statistically significant differences between groups on sociodemographic or clinical variables. Further, there were no statistically significant differences between groups on the majority of baseline measures of psychological variables except that participants who completed time 1 & time 2 measures (study completers) had higher mean scores for embarrassment avoidance and damage beliefs on the cognitive behavioural response scales (Table 5.19).

Table 5.19: Comparisons of sociodemographic and clinical variables assessed at baseline (Time 1) between participants who completed measures at time 1 (non- completers) and those who completed measures at time 1 and time 2 (study completers).

Sociodemographic, clinical and psychological factors.	Non- completers n=52	Study completers (n=170) Response rate: 76.6%	X2 and p values
Type of IBD, n (%)			
1=UC	25 (49.1%)	79 (47%)	Pearson chi2(1)=0.14 p=0.71
2=CD	27 (50.9%)	91 (53%)	
Gender, n (%),			
0=Females	41 (80%)	119 (70%)	Pearson chi2(1)=2.46 p= 0.12
1=Males	11 (19.3)	51 (30%)	
Marital status: n (%)			Pearson chi2(6)=10.05 p=0.12
1=Living with partner	27 (51.9%)	88 (51.2%)	
0=Not living with partner	25 (48.1%)	82 (48.2%)	
Ethnicity: n (%)			Pearson chi2(23)=30.61 p=0.13
1=English / Welsh / Scottish / Northern Irish / British	34 (65.4%)	140 (82.4%)	
2=Mixed multiple	5 (9.6%)	10 (5.8%)	
3=Asian /Asian British	5 (9.6%)	2 (1.2%)	
4=Black British	8 (15.4%)	18 (10.6%)	
Age: n (%)			Pearson chi2(2)=4.35 p=0.13
1=Under 35 yrs.	23 (40.2%)	65 (38.2%)	
2=35-55 yrs.	29 (50.8%)	70 (41.2%)	
3= 55 yrs. and over	5 (9%)	35 (20.6%)	
Work status: n (%)			Pearson chi2(8)=4.22 p=0.84
Paid work	40 (76.9%)	132 (77.8%)	
Not in paid work	12 (23.1%)	38 (22.2%)	
Comorbidity: n (%)			Pearson chi2(1)=0.08 p=0.78
Yes	29 (55.7%)	98 (58%)	
No	23 (44.3%)	72 (42%)	
Source n (%)			Pearson chi2(1)=0.33 p=0.57
Clinic	36 (69.2%)	102 (60%)	
Charity	16 (30.8%)	68 (40%)	
Age of diagnosis (years), mean (SD), (range).	28.65 (11.35), (3-67)	30.30,(3.22), (3-75)	T(218)=-0.80 p=0.42
Years in education (years), mean (SD), (range).	15, (4.4), (3-47)	15.7 (5.4),(3-47)	T(212)=-0.81 p=0.41

Table 5.20: Comparisons of psychological variables assessed at baseline (Time 1) between participants who completed measures at time 1 (non-completers) and those who completed measures at time 1 & time 2 (study completers).

Psychological factor	Non completers n=52 M (SD) or median	Completers (n=170) (Response rate: 76.6%) M (SD) or median	Wilcoxon rank sum and t-tests & p values
Time 1 HADSA	7.00	8.00	z = 0.01 Prob > |z| = 0 .99
Time 1 HADSD	6.00	6.00	z = 0.43 Prob > |z| = 0 .67
Time 1 SIBDQ	44.00	47.50	z = -1.65 Prob > |z| = -0.09
BES	38.06, (15.02)	38.91, (14.44)	T(205)=-0.35 p=0.73
CPAQ	45.33, (13.20)	47.45, (14.76)	T(207)=-0.87 P=0.38
IBS-BRQ: A	56.80, (22.10)	52.60, (15.30)	T(203)= 1.18 p=0.24
IBS-BRQ: S	52.60, (15.30)	48.90, (13.50)	T(203)= 1.65 p=0.10
CBRQ: FA	4.96, (2.99)	5.52, (2.46)	T(220)=-1.14 p=0.16
CBRQ: D	8.00	8.00	z = -1.93 Prob > |z| = 0.06
CBRQ: SF	6.07, (3.51)	6.91, (3.15)	T(220)=-0.10 p=0.92
CBRQ: R	3.00	3.00	z = -0.20 Prob > |z| = 0.84
CBRQ: AL	4.00	5.00	z = -0.61 Prob > |z| = 0.54
CBRQ: EA	5.96, (3.95), 6	7.30, (3.01), 8	T(220)= -2.17 Prob > |z| = 0.03

Participants

The 170 participants who completed measures at baseline (Time 1) and 3 month follow up (Time 2) constitute the sample for the prospective analysis. Seventy nine had a diagnosis of ulcerative colitis of which 67% were female. The majority were British (76%), aged between 35-54, living with a partner, educated to a post graduate level (42.3%), in paid work, had other health problems alongside IBD (55%) and were reporting symptomatic disease activity indicative of relapse (61.3%). The remaining 91 had a diagnosis of Crohn's disease of which 72.5% were female. The majority were British (78.5%), aged between 35-54 (42.9%), living with a partner (50.5%), educated to a post graduate level (30%), in paid work (72.5%), had other health problems (60.4%) and were reporting symptomatic disease activity indicative of relapse (79.1%).

There were no statistically significant differences between people with Crohn's disease and ulcerative colitis on baseline sociodemographic or clinical variables (Table 5.21).

Table 5.21: Sociodemographic, clinical and disease related characteristics of participants completing T1&T2 measures (study completers) by IBD type.

	UC	CD	X2, t-tests & p values
N=170	79 (46.5%)	91 (53.5%)	
Gender: n (%) **Female** **Male**	 52 (67%) 27 (33%)	 66 (72.5%) 25 (27.5%)	Pearson chi2(1) = 0.68 p = 0.41
Marital status: n % **1=living with partner** **2=living alone**	 42 (54%) 36 (46%)	 46 (50.5%) 45 (49.5%)	Pearson chi2(4) = 4.75 p = 0.31
Ethnicity :n % **1=English/Welsh/Scott/etc.** **2=Mixed multiple =2** **3=Asian /Asian British** **4=Black British**	 60 (76%) 11(13.9%) 5 (6.3%) 6 (7.6%)	 71 (78.5%) 13 (13.8%) 5 (5.5%) 5 (5.5%)	Pearson chi2(5) = 5.82 p = 0.32
Age: n % **1=Under 35** **2=35-54** **3=55 and over**	 28 (35.4%) 30 (38%) 21 (26.6%)	 37 (40.7%) 39 (42.9%) 15 (16.4%)	Pearson chi2(2) = 2.15 p = 0.34
Work status: n % **1=Paid work** **2=Not in paid work**	 58 (73.4%) 21 (26.6%)	 66 (72.5%) 25 (27.5%)	Pearson chi2(8) = 11.54 p = 0.17
Comorbidity: n % **1=Yes** **2=No**	 43 (55.1%) 36 (45.9%)	 55 (60.4%) 36 (39.6%)	Pearson chi2(1) = 0.49 p = 0.49 .
Source ; n % **1=NHS Clinic** **2=Patient organisation**	 47 (59.5%) 31 (39.5)	 54 (59.3%) 37 (40.7%)	Pearson chi2(1) = 0.01 p = 0.90
Disease activity relapse (<3 SCCAI or <5 HBI) : n % **Yes** **No**	 46 (61.3%) 29 (38.7%)	 72 (79.1%) 19 (20.9%)	(Different measures so could not be compared)
Age of diagnosis: M. (SD), (range)	31.71 (12.18) (range 3-47)	29.11 (14.01) (range 3-47)	t(167)= -1.28 p=0.20
Years in education: M, (SD), (range)	16.2 (3.9)	15.2 (6.4)	t(158)=-1.11 p=0.27

Baseline Scores of psychological variables by IBD type

Comparisons between study completers with ulcerative colitis and Crohn's disease on baseline measurements of psychological variables demonstrated some statistically significant differences (Table 5.22). Participants with Crohn's disease had higher mean scores for unhelpful beliefs about experiencing negative emotions (BeS), Fear avoidance (CBSQ: FA) and all or nothing (CBSQ: AL) behavioural subscales of the cognitive behaviour responses to symptoms questionnaire. Further participants with Crohn's disease had lower scores for health related quality of life (SIBDQ).

Table 5.22: Comparisons between study completers with ulcerative colitis and Crohn's disease on baseline measurements of psychological measures (Time 1).

Measures(n=170)	UC: mean (SD) or median (n=79)	CD: mean (SD) or median (n=91)	Wilcoxon rank sum , t tests & p values
T1HADSA	8.32 (4.96), 7.5	9.29 (4.66), 9	z = -1.51 Prob > |z| = 0.13
T1HADSD	6.00 (3.61), 6	5.76 (4.61), 5	z = -0.88 Prob > |z| = 0.38
T1SIBDQ	48.69 (12.40), 50	44.44 (10.65),44	z = 2.35 Prob > |z| = 0.02
BES	35.86 (13.63)	41.65 (14.67),	T(159) =2.579 p=0.01
CPAQ	46.92 (14.51)	43.64 (13.88)	T(163 =)-1.48 p=0.14
IBS-BRQ: A	44.40 (20.5)	41.90 (21.5)	T(167)=-0.77 p=0.44
IBS-BRQ: S	47.20 (17.4)	43.80 (18.6)	T(167) =1.24 p=0.22
CBRQ: FA	5.11 (2.28)	5.94 (2.49)	T(167)=--2.42 p=0.03
CBRQ: D	8.19 (2.25), 8.5	8.00 (2.21), 8	z = 0.37 Prob > |z| = 0.71
CBRQ: SF	7.00 (3.21)	6.97 (2.97)	T(166)=-0.05 p=0.93
CBRQ: R	3.42 (3.00), 3	3.98 (2.53), 4	z = -1.85 Prob > |z| = 0.06
CBRQ: AL	4.19 (3.31), 3.5	5.58 (3.35), 6	z = -2.78 Prob > |z| = < 0.01
CBRQ: EA	7.13 (2.84)	7.54 (3.08)	T(167)=0.89 p=0.37

Key : HADSA: hospital anxiety and depression scale: anxiety, **HADSD**: hospital anxiety and depression scale: depression, **SIBDQ**: Short Inflammatory bowel disease questionnaire, **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs, **SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Distribution of anxiety & depression, HRQOL, general psychological distress at 3 month follow up (Time 2).

At 3 month follow up (Time 2) based on scores on the hospital anxiety and depression scale (>11 on HADSA & HADSD) 26.6% of those with ulcerative colitis and 37.4% of participants with Crohn's disease represented probable cases of anxiety and 20.3 % of participants with ulcerative colitis and 19.8% of people with Crohn's disease reported scores indicative of probable cases of depression. Based on total HADS scores 30.4% of participants with ulcerative colitis and 42.9% of those with Crohn's diseases had scores indicative of a probable case of general psychological distress. Scores for health related quality of life on the Simple inflammatory bowel disease questionnaire (SIBDQ) at 3 month follow up (Time 2) suggest that 69.2% of participants with ulcerative colitis and 87.9% of participants with Crohn's disease were cases of poor quality of life (Table 5.23). The differences in the distribution of cases of anxiety and depression for the different types of IBD were not statistically significant. The CD group was, however, more likely to report being a case of psychological distress and poor health related quality of life than the UC group and this relationship was statistically significant.

Table 5.23: Time 2 cases of anxiety, depression, psychological distress and health related quality of life by disease type.

N=170	UC	CD	X2 & p value
n (%) cases of Anxiety at time 2 (scoring 11 or over on HADSA)			Pearson chi2(1) = 2.09 p=0.15
Yes	21 (26.6%)	34 (37.4%)	
No	57 (72.15%)	57 (62.6%)	
n (%) cases of depression at time 2 (scoring 11 or over on HADSD)			Pearson chi2(1) = 0.01 p=0.91
Yes	16 (20.3%)	18 (19.8%)	
No	62 (79.3%)	73 (80.2%)	
N (%) Cases of general psychological distress at time 2 (scoring 11 or more on HADST)			Pearson chi2(1) = 10.94 p=0.001
Yes	24 (30.4%)	39 (42.9%)	
No	54 (69.6%)	52 (57.1%)	
N (%) Cases of poor quality of life at time 2 (scoring 56 or less SIBDQ)			Pearson chi2(1) = 7.44 p=0.01
Yes	54 (69.2%)	80 (87.9%)	
No	24 (30.8%)	11 (12.1%)	

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of anxiety at 3 month follow up (Time 2)

Based on the univariable analysis (Table 5.24), sociodemographic and clinical variables assessed at baseline (Time 1) significantly associated with cases of anxiety at 3 month follow up (Time 2) were gender, age and disease activity for Crohn's disease and ulcerative colitis.

Table 5.24: Univariate analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 2 cases of moderate anxiety (=>11 HADSA)

Socio- demographic & clinical variables.	Non cases	Cases	Unadjusted odds ratio with 95% CI and p value:
Gender			
0=Female	73	46	0.34 (0.15-0.76) p=0.01
1=Male	42	9	
Age :			
1=Under 35 yrs.	40	25	
2=35-55 yrs.	47	23	0.78 (0.39-1.59) p=0.50
3= 55 yrs. and over	28	7	0.40 (0.15-1.05) p=0.06
Marital status			
1=Living with partner	57	31	
0=Living alone	58	24	1.31 (0 69-2.51) p= 0.407
Ethnicity			
1=English / Welsh / Scottish	69	26	
2=Mixed/multiple	5	3	0.89 (0.88-8.89) p=0.19
3=Asian/Asian British	6	0	0.66 (0.13-3.33) p=0.62
4= Black British	8	2	1.33 (0.12-15.26) p=0.82
Comorbidity			
1=Yes	64	34	
0=No	50	21	1.27 (0.66-2.44) p=0.48

Sociodemographic & Clinical factors (continuous data)	Mean & (SD)	Unadjusted odds ratio, (95% CI) and p value
Disease activity : Ulcerative colitis	4.53 (3.68)	1.38 (1.15-1.65) p=0.001
Disease activity : Crohn's disease	6.63 (3.36)	1.15 (1.04-1.28) p=0.01
Age of Diagnosis	30.30 (13.22)	0.99 (0.97-1.02) p=0.77
Years in education	15.71 (5.39)	0.97 (.907-1.03) p=0.35

Univariable analysis identified statistically significant associations between all psychological measures assessed at time 1 and time 2 cases of anxiety when unadjusted for sociodemographic or clinical variables (Table 5.25). Adjusting for age or gender had little impact on these relationships. However the associations between some psychological variables assessed at time 1 and time 2 cases of anxiety were reduced or eliminated when symptomatic disease activity was adjusted for. For the UC group, after adjusting for disease activity time 2 cases of anxiety were associated with time 1 anxiety (HADSA), depression (HADSD), lower quality of life (SIBDQ), lower levels of acceptance beliefs towards symptoms (CPAQ), avoidant behavioural responses to gastrointestinal symptoms (IBS-BRQ: A), fear avoidance beliefs (CBRQ: FA), damage beliefs (CBRQ; D), symptom focusing (CBSQ: SF), resting behaviour (CBRQ: R) and all or nothing behaviour(CBRQ: AL). For the CD group, after adjusting for disease activity time 2 cases of anxiety were associated with baseline anxiety (HADSA), lower levels of acceptance beliefs (CPAQ), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ), symptom focusing (CBRQ: SF), all or nothing behaviour (CBRQ: AL) and embarrassment avoidance beliefs (CBRQ: EA).

Table 5.25: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 2 cases of moderate anxiety (=>11 HADSA) (unadjusted and adjusted)

Psychological Variables:	Unadjusted odds ratio with 95% CI and p value: (Whole sample n=170)	Adjusted for Gender (Whole sample n=170)	Adjusted for age (Whole sample n=170)	Adjusted for disease activity: Ulcerative colitis (UC) (UC group only n=79)	Adjusted for disease activity: Crohn's disease (CD) (CD group only n=91)
T1HADSA	1.35 (1.22-1.50) p<0.01	1.35 (1.22-1.50) p<0.01	1.35 (1.22-1.50) p<0.01	1.35 (1.13-1.62) p<0.01	1.29 (1.13-1.47) p<0.01
T1HADSD	1.30 (1.16-1.42) p<0.01	1.27 (1.15-1.41) p<0.01	1.34 (1.20-1.50) p<0.01	1.54 (1.21-1.95) p<0.01	1.09 (0.95-1.26) p=0.21
T1SIBDQ	0.92 (0.89-0.94) p<0.01	0.92 (0.89-0.95) p<0.001	0.916 (0.88-0.95) p<0.01	0.86 (0.78-0.93) p<0.01	0.97 (0.92-1.03) p=0.37
BeS	1.04 (1.01-1.06) p=0.005	1.04 (1.01-1.06) p=0.003	1.04 (1.01-1.06) p=0.07	1.03 (0.99-1.08) p=0.22	1.03(0.98-1.06) p=0.29
CPAQ	0.94 (0.92-.097) p<0.01	0.94 (0.91-0.97) p<0.01	0.94 (0.92-0.97) p<0.01	0.94 (0.89-.099) p=0.03	0.96 (0.93-0.99) p=0.04
IBS-BRQ: A	1.04 (1.02-1.06) p<0.001	1.04 (1.02-1.06) p<0.001	1.04 (1.02-1.06) p<0.001	1.04 (1.00-1.09) p=0.01	1.04(1.01-1.06) p<0.01
IBS-BRQ: S	1.07 (1.04-1.11) p<0.001	1.07 (1.04-1.11) p<0.001	1.07 (1.04-1.11) p<0.001	1.06 (0.99-1.13) p=0.07	1.07 (1.03-1.12) p<0.001
CBRQ: FA	1.33 (1.14-1.54) p<0.01	1.35 (1.15-1.57) p<0.01	1.36 (1.14-1.56) p<0.01	1.23 (0.93-1.63) p=0.02	1.16 (0.95-1.42) p=0.14
CBRQ: D	1.21 (1.03-1.42) p=0.018	1.25 (1.06-1.47) p=0.01	1.19 (1.02-1.40) p=0.03	1.42 (1.01-1.98) p=0.04	1.12 (0.92-1.37) p=0.27
CBRQ: SF	1.29 (1.14-1.42) p<0.01	1.31 (1.15-1.50) p<0.01	1.29 (1.13-1.47) p<0.01	1.41 (1.08-1.86) p=0.01	1.16 (0.97-1.33) p=0.01
CBRQ: R	1.34 (1.18-1.53) p<0.001	1.32 (1.56-1.51) p<0.01	1.33 (1.16-1.52) p<0.01	1.34 (1.07-1.70) p=0.01	1.19 (0.98-1.43) p=0.07
CBRQ: Al	1.39 (1.23-1.57) p<0.01	1.37 (1.21-1.56) p<0.01	1.38 (1.22-1.56) p<0.01	1.31 (1.07-1.61) p=0.01	1.39 (1.13-1.61) p=<0.01
CBRQ: EA	1.20 (1.01-1.36) p=0.02	1.19 (1.05-1.34) p=0.01	1.20 (1.07-1.36) p=0.01	0.99 (0.81-1.23) p=0.97	1.22 (1.04-1.45) p=0.01

Key : HADSA: hospital anxiety and depression scale: anxiety, **HADSD**: hospital anxiety and depression scale: depression, **SIBDQ**: Short Inflammatory bowel disease questionnaire, **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs , **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Each psychological factor was then entered on its own in a multivariable model collectively with all statistically significant sociodemographic and clinical variables to further test associations with time 2 cases of anxiety. For the UC group, the relationships between fear avoidance beliefs and all or nothing behaviour and time 2 cases of anxiety were no longer significant (Table 5.26). For the CD group, symptom focusing was no longer a significant predictor of time 2 anxiety (Table 5.27).

Table 5.26: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 2 cases of moderate anxiety (=>11 HADSA) on its own in a gender, age and symptomatic disease activity adjusted model (UC).

Independent predictors	Adjusted for gender, age and disease activity : Odds ratio, confidence interval and p value (UC group)
T1HADSA	1.40 (1.15-0.49) p =< 0.01
T1HADSD	1.60 (1.22-2.08) p=<0.01
T1SIBDQ	0.86 (0.79-0.94) p=< 0.01
BeS	1.04 (0.99-1.09 p=0.13
CPAQ	0.93 (0.87-0.99) p= 0.02
IBS-BRQ: A	1.04 (1.00-1.09) p=0.04
IBS-BRQ: S	1.06 (0.98-1.14) p=0.13
CBRQ: Fear avoidance	1.28 (0.93-1.76) p= 0.12
CBRQ: Damage beliefs	1.60 (1.04-2.44) p= 0.03
CBRQ: Symptom focusing	1.55 (1.12-2.17) p=0.01
CBRQ: Resting	1.31 (1.03-1.68) p= 0.03
CBRQ: All or nothing	1.24 (0.98-1.57) p=0.08
CBRQ: Embarrassment avoidance	0.99 (0.79-1.23) p=0.91

Table 5.27: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 2 cases of moderate anxiety (=>11 HADSA) on its own in a gender, age and symptomatic disease activity adjusted model (CD)

Independent predictors	Adjusted gender, age and symptomatic disease activity Adjusted Odds ratio, confidence interval and p value (CD group)
T1HADSA	1.28 (1.11-1.48) p<0.01
T1HADSD	1.12 (0.98-1.29) p=0.09
T1SIBDQ	0.97 (0.92-1.02) p=0.25
Bes	1.02 (0.99-1.06) p=0.21
CPAQ	0.96 (0.92-0.99) p=0.02
IBS-BRQ: A	1.04 (1.01-1.06) p<0.01
IBS-BRQ: S	1.07 (1.03-1.12) p<0.01
CBRQ: Fear avoidance	1.21 (0.98-1.49) p=0.08
CBRQ: Damage beliefs	1.14 (0.93-1.40) p=0.21
CBRQ: Symptom focusing	1.17 (0.99-1.39) p=0.62
CBRQ: Resting	1.15 (0.95-1.41) p=0.16
CBRQ: All or nothing	1.34 (1.12-1.60) p<0.01
CBRQ: Embarrassment avoidance	1.22 (1.03-1.47) p=0.01

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of depression at 3 month follow up (Time 2)

Univariable analysis identified no significant associations between any sociodemographic variables assessed at baseline (Time 1) and cases of depression assessed at three month follow up (Time 2). Statistically significant associations were identified between disease activity in ulcerative colitis and Crohn's disease and cases of depression at 3 month follow up (Time 2) (Table 5.28)

Univariable analysis identified statistically significant associations between the majority of psychological measures (all except for damage beliefs (CBSQ: D) and embarrassment avoidance beliefs (CBSQ: EA)) assessed at time 1 and time 2 cases of depression when unadjusted for clinical variables (Table 5.29).

Adjusting for symptomatic disease activity significantly reduced or eliminated the majority of these relationships. For the UC group after adjusting for symptomatic disease activity time 2 cases of depression were associated with time 1 anxiety (T1HADSA), and depression (T1HADSD). For the CD group, after adjusting for symptomatic disease activity, time 2 cases of depression were associated with time 1 anxiety (T1HADSA), depression (T1HADSD), and poor quality of life (T1SIBDQ). Individual psychological factors were not tested further in separate multivariable models as there were no additional significantly associated sociodemographic or clinical variables to collectively include in the analysis.

Table 5.28: Univariate analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 2 cases of moderate depression (=>11 HADSD)

Socio-demographic variables	Non cases	Cases	Unadjusted odds ratio with 95% CI and p value:
Gender			
0=Female	92	27	
1=Male	44	7	0.51 (0.22-1.34) p=0.19
Age :			
1=Under 35 yrs.	51	14	
2=35-55 yrs.	56	14	0.91 (0.39-2.09) p=0.83
3= 55 yrs. and over	29	7	0.75 (0.26-2.17) p=0.60
Marital status			
1=Living with partner	74	14	
0=Living alone	62	20	0.59 (0.27-1.26) p= 0.17
Ethnicity			
1=English / Welsh / Scottish /etc.	80	15	
2=Mixed/multiple	7	1	1.78 (0.17-18.26) p=0.63
3=Asian/Asian British	6	0	1.01 (0.20-5.30) p=0.71
4= Black British	8	2	1.33 (0.26-6.90) p=0.73
Comorbidity			
1=Yes	79	19	
0=No	56	15	0.89 (0.42-1.92) p=0.78

Sociodemographic & Clinical factors (continuous data)	Mean & (SD)	Unadjusted odds ratio, (95% CI) and p value
Disease activity: Ulcerative colitis	4.53 (3.68)	1.39 (1.15-1.68) p=0.001
Disease activity: Crohn's disease	6.63 (3.36)	1.21 (1.06-1.38) p=0.003
Age of diagnosis	30.30 (13.22)	1.01 (0.98-1.04) p=0.55
Years in education	15.71 (5.39)	0.94 (0.87-1.02) p=0.16

Table 5.29: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 2 cases of moderate depression (=>11 HADSD) (unadjusted and adjusted).

Psychological variable	Unadjusted odds ratio with 95% CI and p value: (Whole sample n =170)	Adjusted for disease activity UC (UC group only n= 79)	Adjusted for disease activity T2CD (CD group only n=91)
T1 HADSA	1.26 (1.14-1.38) p<0.001	1.22 (1.04-1.42) p=0.02	1.18 (1.03-1.34) p=0.001
T1 HADSD	1.37 (1.22-1.54) p<0.001	1.39 (1.12-1.73) p<0.01	1.22 (1.03-1.45) p=0.02
T1 SIBDQ	.922 (.886-.959) p<0.001	0.96 (0.89-1.03) p=0.29	0.95 (0.89-1.02) p=0.04
BES	1.04 (1.01-1.07) p=0.007	1.02 (0.97-1.07) p=0.42	1.03 (0.99-1.07) p=0.18
CPAQ	0.95 (0.92-0.98) p=0.002	0.97 (0.92-1.03) p=0.34	0.97 (0.93-1.01) p=0.17
IBS-BRQ: A	1.03 (1.03-1.05) p=<0.01	1.02 (0.98-1.07) p=0.31	1.01 (0.99-1.04) p=0.44
IBS-BRQ: S	1.07 (1.03-1.11) p<0.001	1.06 (0.98-1.14) p=0.14	1.04 (0.99-1.09) p=0.07
CBRQ: FA	1.34 (1.13-1.59) p=0.001	1.18 (0.88-1.59) p=0.26	1.18 (0.92-1.52) p=0.20
CBRQ: D	1.10 (0.92-1.30) p=0.295	0.96 (0.67-1.38) p=0.82	0.01 (0.79-1.27) p=0.98
CBRQ: SF	1.20 (1.05-1.38) p=0.008	1.17 (0.90-1.51) p=0.24	1.03 (0.86-1.25) p=0.73
CBRQ: R	1.22 (1.07-1.40) p=0.003	1.07 (0.87-1.32) p=0.53	1.09 (0.87-1.35) p=0.45
CBRQ: AL	1.20 (1.07-1.35) p=0.002	1.05 (0.86-1.28) p=0.62	1.12 (0.93-1.36) p=0.23
CBRQ: EA	1.09 (0.96-1.24) p=0.191	1.09 (0.88-1.35) p=0.43	0.79 (0.61-1.01) p=0.06

Key : HADSA: hospital anxiety and depression scale: anxiety, **HADSD**: hospital anxiety and depression scale: depression, **SIBDQ**: Short Inflammatory bowel disease questionnaire, **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of general psychological distress at 3 month follow up (Time 2).

Univariable analysis identified statistically significant associations between gender, comorbid health problems, years in education and symptomatic disease activity for both UC and CD assessed at baseline (Time 1) and cases of general psychological distress assessed at 3 month follow up (Time 2) (Table 5.30). Univariable analysis identified statistically significant associations between all-time 1 psychological measures except for damage beliefs (CBRQ: D) and time 2 cases of general psychological distress when unadjusted for sociodemographic or clinical variables (Table 5.31). Adjusting for gender, comorbidity or years in education had minimal impact on these relationships, however adjusting for symptomatic disease activity reduced or eliminated some significant associations.

Table 5.30: Univariate analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 2 cases of general psychological distress (=>15 HADST).

Socio-demographic variables	Non cases	Cases	Unadjusted odds ratio with 95% CI and p value:
Gender			
0=Female	58	61	0.40 (0.20-0.8) p=0.01
1=Male	36	15	
Age :			
1=Under 35 yrs.	35	30	
2=35-55 yrs.	36	34	1.10 (0.56-2.17) p=0.78
3= 55 yrs. and over	23	12	0.60 (0.26-1.43) p=0.25
Marital status			
1=Living with partner	49	39	0.97 (0.53-1.77) p= 0.92
0=Living alone	45	37	
Ethnicity			
1=English / Welsh / Scottish / etc.	63	32	
2=Mixed/multiple	4	4	1.97 (0.27-14.63) p=0.51
3=Asian/Asian British	5	1	0.39 (0.26-14.63) p=0.40
4= Black British	7	3	0.84 (0.09-11.27) p=0.81
Comorbidity			
1=Yes	47	51	1.99 (1.07-3.74) p=0.03
0=No	46	25	

Sociodemographic & Clinical factors (continuous data)	Mean & (SD)	Unadjusted odds ratio, (95% CI) and p value
Disease activity: Ulcerative colitis:	4.53 (3.68)	1.37 (1.15-1.62) p<0.001
Disease activity: Crohn's disease	6.63 (3.36)	1.21 (1.07-1.36) p=0.002
Age of diagnosis	30.30 (13.22)	1.01 (0.990-1.04) p=0.25
Years in education	15.71 (5.39)	0.908 (0.847-.975) p=0.007

After adjusting for symptomatic disease activity for the UC group, time 2 cases of general psychological distress were associated with time 1 anxiety (T1HADSA), time 1 depression (T1HADSD), time 1 poor health related quality of life (T1SIBDQ), unhelpful beliefs about emotions (BeS), lower levels of acceptance beliefs towards symptoms (CPAQ) and all or nothing behaviour (CBRQ: Al). For the CD group, time 2 cases of general psychological distress were associated with baseline anxiety, (T1HADSA), baseline depression (T1HADSD), poor health related quality of life (T1SIBDQ), lower levels of acceptance beliefs towards symptoms (CPAQ), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ: A & S) and all or nothing behaviour (CBRQ: Al) (Table 8.1).

Table 5.31: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 2 cases of general psychological distress (=>15 HADST) (unadjusted and adjusted)

Psychological variable	Unadjusted odds ratio with 95% CI and p value: (Whole group n=170)	Adjusted for gender (Whole group n=170)	Adjusted for comorbidity	Adjusted for years in education	Adjusted for disease activity UC (UC group only n=79)	Adjusted for disease activity CD (CD group only n=91)
T1 HADSA	1.37 (1.23-1.52) p<0.001	1.37 (1.23-1.52) p<0.001	1.37 (1.23-1.52) p<0.001	1.36 (1.22-1.51) P<0.001	1.35 (1.14-1.61) p=0.001	1.29 (1.12-1.50) p=0.001
T1 HADSD	1.37 (1.23-1.53) p<0.001	1.37 (1.23-1.53) p<0.001	1.36 (1.22-1.52) p<0.001	1.34 (1.20-1.50) p<0.001	1.51 (1.20-1.90) p<0.001	1.25 (1.06-1.48) p-0.007
T1 SIBDQ	0.89 (0.86-0.93) p<0.001	0.40 (0.20-0.80) p=0.010	0.89 (0.86-0.92) p<0.001	0.89 (0.86-0.93) p<0.001	1.37 (1.15-1.61) p<0.001	1.21 (1.07-1.36) p=0.002
BES	1.04 (1.02-1.07) p<0.001	1.05 (1.02-1.07) p<0.001	1.04 (1.02-1.07) p=0.001	1.04 (1.02-1.07) p<0.001	1.05 (1.01-1.10) p=0.002	1.02 (0.98-1.05) p=0.34
CPAQ	0.94 0 (.91-0.96) p<0.001	0.93 (0.91-0.96) p<0.001	0.94 (0.91-0.97) p<0.001	0.94 (0.92-0.97) p<0.001	0.94 (0.89-0.10) p=0.04	0.96 (0.92-.0.99) p=0.020
IBS–BRQ: A	1.03 (1.02-1.05) p<0.001	1.03 (1.02-1.05) p<0.001	1.03 (1.02-1.05) p<0.001	1.03 (1.02-1.05) p<0.001	1.03 (0.99-1.05) p=0.10	1.02 (1.01-1.06) p=0.02
IBS-BRQ: S	1.05 (1.02-1.08) p<0.001	1.05 (1.02-1.08) p<0.001	1.05 (1.02-1.08) p<0.001	1.05 (1.02-1.08) p<0.001	1.05 (0.99-1.11) p=0.09	1.05 (1.01-1.09) p=0.02
CBRQ: FA	1.29 (1.12-1.48) p<0.001	1.31 (1.13-1.51) P<0.001	1.27 (1.10-1.50) p=0.001	1.24 (1.06-1.43) p<0.0005	1.03 (0.80-1.34) P=0.82	1.17 (0.96-1.43) P=0.12
CBRQ: D	1.13 (0.98-1.30) p=0.09	1.16 (1.01-1.33) p=0.04	1.13 (0.97-1.31) p=0.09	1.13 (0.98-1.31) p=0.087	1.04 (0.77-1.40) p=0.79	1.09 (0.90-1.34) p=0.37
CBRQ: SF	1.18 (1.06-1.32) p=0.002	1.19 (1.07-1.33) p=0.002	1.20 (1.07-1.33) p=0.001	1.19 (1.06-1.33) p=0.03	1.19 (0.95-1.48) p=0.13	1.08 (0.93-1.26) p=0.34
CBRQ: R	1.23 (1.09-1.38) p=0.001	1.21 (1.07-1.36) p=0.003	1.21 (1.07-1.37) p=0.002	1.22 (1.08-1.39) p=0.002	1.12 (0.91-1.35) p=0.31	1.10 (0.92-1.33) p=0.30
CBRQ: AL	1.34 (1.20-1.49) p<0.001	1.32 (1.18-1.48) p<0.001	1.36 (1.21-1.53) p=0.0001	1.35 (1.20-1.53) p<0.001	1.24 (1.03-1.52) p=0.03	1.23 (1.05-1.44) p=0.01
CBRQ: EA	1.18 (1.06-1.32) p=0.002	1.17 (1.05-1.30) p=0.006	1.17 (1.05-1.31) p=0.005	1.17 (1.04-1.32) p=0.007	0.96 (0.78-1.18) p=0.70	1.17 (0.99-1.39) p=0.06

Each psychological factor was then tested individually in a multivariable model with all statistically significant sociodemographic and clinical variables included (gender, comorbidity, years in education and symptomatic disease activity) to further test associations with time 2 cases of general psychological distress. For the UC group, the relationships between time 1 anxiety (HADSA), depression (HADSD), poor health related quality of life (T1SIBDQ) and lower levels of acceptance beliefs towards symptoms (CPAQ) and time 2 cases of psychological distress remained significant whilst unhelpful beliefs about experiencing and expressing negative emotions (BES) and all or nothing behaviour did not (Table 5.32). For the CD group the relationships between time 1 anxiety (T1HADSA), depression (T1HADSD), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ) and all or nothing behaviour (CBRQ: AL) and time 2 cases of general psychological distress retained their significance but baseline poor health related quality of life (T1SIBDQ) and lower levels of acceptance beliefs towards symptoms (CPAQ) did not (Table 5.33).

Table 5.32: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 2 cases of general psychological distress (=>15 HADST) on its own in a gender, years in education, comorbidity, symptomatic disease activity adjusted model (UC)

Independent predictors	Adjusted for gender, yrs. in education , comorbidity & disease activity : Odds ratio, confidence interval and p value (UC group)
T1 HADSA	1.38 (1.13-1.69) p=0.001
T1 HADSD	1.48 (1.18-1.85) p=0.001
T1 SIBDQ	0.81 (0.73-0.92) p=0.001
BeS	1.05 (0.99-1.10) p=0.081
CPAQ	0.94 (0.88-0.99) p=0.03
IBS-BRQ: A	1.03 (0.92-1.05) p=0.24
IBS-BRQ: S	1.04 (0.97-1.01) p=0.26
CBRQ: Fear avoidance	1.08 (0.81-1.43) p=0.60
CBRQ: Damage beliefs	1.07 (0.79-1.46) p=0.68
CBRQ: Symptom focusing	1.24 (0.97-1.58) p=0.09
CBRQ: Resting	1.07 (0.86-1.33) p=0.55
CBRQ: All or nothing	1.18 (0.93-1.48) p=0.17
CBRQ: Embarrassment avoidance	0.97 (0.75-1.15) p=0.49

Table 5.33: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 2 cases of general psychological distress (=>15 HADST) on its own in a gender, years in education, comorbidity, symptomatic disease activity adjusted model (CD)

Independent predictors	Adjusted for gender, years in educations, comorbidity and disease activity : Odds ratio, confidence interval and p value (CD group)
T1HADSA	1.28 (1.10-1.51) p=0.002
T1HADSD	1.21 (1.01-1.44) p=0.04
T1SIBDQ	0.95 (0.89-1.01) p=0.09
BeS	1.02 (0.98-1.06) p=0.35
CPAQ	0.96 (0.92-1.00) p=0.07
IBS-BRQ: A	1.03 (1.01-1.05) p=0.01
IBS-BRQ: S	1.05 (1.01-1.10) p=0.02
CBRQ: Fear avoidance	1.12 (0.91-1.39) p=0.29
CBRQ: Damage beliefs	1.20 (0.96-1.50) p=0.12
CBRQ: Symptom focusing	1.12 (0.94-1.33) p=0.19
CBRQ: Resting	1.11 (0.90-1.37) p=0.31
CBRQ: All or nothing	1.35 (1.11-1.64) p<0.01
CBRQ: Embarrassment avoidance	1.17 (0.98-1.41) p=0.09

Sociodemographic, clinical and psychological factors assessed at baseline (Time 1) associated with cases of poor health related quality of life at 3 month follow up (Time 2).

Univariable analysis identified statistically significant associations between age and symptomatic disease activity for both UC and CD assessed at baseline (Time 1) and cases of poor health related quality of life at 3 month follow up (Time 2) (Table 5.34).

Table 5.34: Univariable analysis: Sociodemographic & clinical factors assessed at time 1 associated with time 2 cases of poor health related quality life (=<56 SIBDQ)

Socio-demographic variables	Non cases	Cases	Unadjusted odds ratio with 95% CI and p value:
Gender (female =0 male =1)			
Female	22	97	0.66 (0.30-1.45) p=0.30
Male	13	38	
Age			
under 35=1	9	56	
35-55=2	14	56	0.64 (0.26-1.60) p=0.34
Over 55=3	12	23	0.31 (0.11-0.83) p=0.02
Marital status			1.02 (0.48-2.14) p=0.96
Living with Partner =1	18	70	
Living alone= 0	17	65	
Ethnicity			
1=English / Welsh / Scottish /etc.	28	67	
2=Mixed/multiple.	3	5	1.25 (0.13-12.58) p=0.85
3=Asian/Asian British.	1	5	0.31 (0.11-0.83) p=0.51
4=Black British.	1	9	3.76 (0.46-31.10) p=0.22
Comorbidity (no=0 yes=1)			
Yes	17	81	1.62 (0.77-3.40) p=0.21
No	18	53	

Sociodemographic & Clinical factors (continuous data)	Mean & (SD)	Unadjusted odds ratio with 95% CI and p value
Disease activity: Ulcerative colitis:	4.53 (3.68)	1.18 (1.0-1.38) p=0.05
Disease activity: Crohn's disease	6.63 (3.36)	1.39 (1.10-1.77) p=0.007
Age of diagnosis	30.30 (13.22)	0.90 (0.96-1.02) p=0.44
Years in education	15.71 (5.39)	0.96 (0.91-1.03) p=0.26

Univariable analysis identified statistically significant associations between time 1 anxiety (T1HADSA), depression (T1HADSD), poor health related quality of life (T1SIBDQ), unhelpful beliefs about experiencing negative emotions (BeS), lower levels of acceptance beliefs towards symptoms (CPAQ), avoidant and safety seeking behavioural responses to gastrointestinal symptoms (IBS-BRQ) and all or nothing behaviour (CBSQ: Al) and time 2 cases of poor health related quality of life when unadjusted for sociodemographic or clinical variables (Table 5.35). Adjusting for age had minimal effect on these associations. Adjusting for symptomatic disease activity had a significant impact on the majority of relationships.

After adjusting for symptomatic disease activity, time 2 cases of poor quality of life were not significantly associated with any psychological measures assessed at baseline for the UC group (Table 5.35). For the CD there were significant relationships with time 1 depression (T1HADSD) and poor health related quality of life (T1SIBDQ). These associations remained unchanged when each psychological factor was tested on its own in a multivariable model which included age and symptomatic disease activity collectively (Table 5.36 & 5.37).

Table 5.35: Univariable and multivariable analysis: Psychological variables assessed at time 1 associated with time 2 cases of poor quality of life (=<56 SIBDQ) (unadjusted and adjusted)

Psychological variable	Unadjusted odds ratio with 95% CI and p value: (Whole sample n=170)	Adjusted for age (Whole sample n=170)	Adjusted for disease activity (UC) (UC group only n=79)	Adjusted for disease activity (CD) (CD group only n=91)
T1 HADSA	1.16 (1.05- 1.28) p=0.003	1.15 (1.04-1.27) p<0.01	1.06 (0.92-1.20) p=0.47	1.11 (0.92-1.33) p=0.28
T1 HADSD	1.27 (1.12-1.44) p<0.001	1.26 (1.11-1.44) p<0.001	1.05 (0.90-1.24) p=0.46	1.54 (1.12-2.11) p=0.01
T1 SIBDQ	0.91 (0.87-0.95) p<0.001	0.91 (0.86-0.95) p<0.001	0.97 (0.91-1.02) p=0.21	0.87 (0.91-1.26) p=0.03
BES	1.02 (0.99-1.05) p=0.01	1.02 (1.00-1.05) p=0.02	0.99 (0.95-1.03) p=0.59	1.02 (0.96-1.07) p=0.64
CPAQ	0.96 (0.94-0.99) p=0.01	0.97 (0.94-0.99) p=0.02	0.99 (0.90-1.05) p=0.97	0.96 (0.90-1.01) p=0.13
IBS BRQ: A	1.03 (1.01-1.05) p<0.01	1.02 (1.01-1.04) p=0.02	1.01 (0.99-1.04) p=0.62	1.03 (0.99-1.06) p=0.23
IBS-BRQ: S	1,03 (1.01-1.06) p=0.02	1,03 (1.01-1.06) p=0.04	1.01(0.96-1.05) p=0.84	1.05 (0.99-1.11) p=0.10
CBRQ: FA	1.07 (0.91-1.24) p=0.42	1.05 (0.90-1.23) p=0.52	0.73 (0.55-0.96) p=0.12	1.25 (0.92-1.69) p=0.15
CBRQ: D	0.88 (0.74-1.05) p=0.15	0.84 (0.69-1.01) p=0.06	0.96 (6.76-1.20) p= 0.70	0.67 (0.43-1.05) p=0.06
CBRQ: SF	1.08 (0.96-1.22) p=0.20	1.05 (0.93-1.19) p=0.41	1.02 (0.87-1.20) p=0.79	1.10 (0.87-1.39) p=0.41
CBRQ: R	1.09 (0.94-1.25) p =0.26	1.04 (0.89-1.20) p=0.61	0.94 (0.77-1.15) p=0.54	1.03 (0.77-1.37) p=0.86
CBRQ: AL	1.14 (1.01-1.28) p=0.03	1.12 (0.99-1.27) p=0.06	1.13 (0.94-1.40) p=0.17	0.94 (0.75-1.19) p=0.60
CBRQ: EA	1.06 (0.94-1.20) p=0.36	1.05 (0.93-1.19) p=0.45	0.94 (0.78-1.12) p= 0.47	1.12 (0.88-1.42) p=0.35

Key : HADSA: hospital anxiety and depression scale: anxiety, **HADSD**: hospital anxiety and depression scale: depression, **SIBDQ**: Short Inflammatory bowel disease questionnaire, **BES**: beliefs about emotions scale, **CPAQ:** acceptance scale adapted from the chronic pain acceptance questionnaire, **IBS-BRQ:** irritable bowel syndrome behavioural response questionnaire, **A**: avoidance behaviour, **S:** safety seeking behaviour, **CBRQ:** cognitive behavioural responses questionnaire, **FA**: fear avoidance beliefs, **D:** damage beliefs**, SF:** symptom focusing, **R:** resting behaviour, **AL**: all or nothing behaviour, **EA**: embarrassment avoidance beliefs

Table 5.36: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 2 cases of poor quality of life (=<56 SIBDQ) on its own in an age and symptomatic disease activity adjusted model (UC)

Independent predictors	Adjusted for age and disease activity : Odds ratio, confidence interval and p value (UC group)
T1(HADSA	1.03 (0.90-1.17) p= 0.68
T1HADSD	1.02 (0.88- 1.18) p= 0.82
T1SIBDQ	0.98 (0.93-1.04) p= 0.57
BeS	0.99 (0.95- 1.03) p=0.64
CPAQ	1.01 (0.97- 1.06) p= 0.59
IBS-BRQ: A	1.01 (0.98- 1.02) p= 0.86
IBS-BRQ: S	1.01 (0.95-1.05) p=0.96
CBRQ: Fear avoidance	0.90 (0.76-1.07) p=0.25
CBRQ: Damage beliefs	0.83 (0.64-1.05) p=0.13
CBRQ: Symptom focusing	0.92 (0.76-1.12) p= 0.40
CBRQ: Resting	0.89 (0.73-1.12) p= 0.33
CBRQ: All or nothing	1.12 (0.92-1.38) p= 0.27
CBRQ: Embarrassment avoidance	0.84 (0.67-1.04) p=0.17

Table 5.37: Multivariable analysis: Each psychological factor assessed at time 1 associated with time 2 cases of poor quality of life (=<56 SIBDQ) on its own in an age and symptomatic disease activity adjusted model (CD)

Independent predictors	Adjusted for age and disease activity : Odds ratio, confidence interval and p value (CD group)
T1(HADSA	1.10 (0.91- 1.33) p=0.33
T1HADSD	1.63 (1.14- 2.35) p=<0.01
T1SIBDQ	0.87 (0.77-0.99) p= 0.03
BeS	1.02 (0.96- 1.08) p=0.53
CPAQ	0.96 (0.91-1.02) p=0.17
IBS-BRQ: A	1.02 (0.99-1.05) p=0.23
IBS-BRQ: S	1.04 (0.98-1.10) p=0.17
CBRQ: Fear avoidance	1.20 (0.87-1.64) p=0.26
CBRQ: Damage beliefs	0.67 (0.42-1.05) p=0.08
CBRQ: Symptom focusing	1.08 (0.85-1.37) p=0.51
CBRQ: Resting	0.98 (0.72-1.35) p=0.92
CBRQ: All or nothing	0.95 (0.75-1.22) p=0.70
CBRQ: Embarrassment avoidance	1.17 (0.91-1.51) p=0.22

5.5: Discussion

As hypothesised this study found that unhelpful cognitive, emotional and behavioural responses were associated with baseline (Time 1) cases of anxiety, depression, general psychological distress and poor quality of life for adults with inflammatory bowel disease, when taking sociodemographic and clinical factors into account. In addition, a range of these responses were found to increase the risk of being a case of anxiety, depression, general psychological distress or poor health related quality of life at three month follow up (Time 2). The results will now be discussed in more detail.

Anxiety

The prevalence of probable cases of anxiety in this study was approximately 30% for the UC group and 37% for the CD group at baseline (Time 1) and 3 month follow up (Time 2). This is similar to the 31.6% reported in the empirical literature for life time prevalence rates of anxiety in this population (Walker et al, 2008).

The cross sectional analysis identified baseline cases of anxiety to be associated with a largely similar range of psychological responses for both the UC and CD group. After adjusting for significant sociodemographic and clinical factors, time 1 cases of anxiety for both groups were associated with; believing it to be unacceptable to experience and express negative emotions (BeS), lacking acceptance beliefs towards symptoms (CPAQ), thinking a lot about symptoms (CBRQ: SF), feeling ashamed of symptoms (CBRQ: EA), avoidant

behavioural responses to symptoms such as knowing the whereabouts of the nearest toilets or carrying spare clothes (IBS-BRQ: A) and overdoing things on a good day when symptoms were minimal (CBRQ: AL). For the UC group only, perceiving symptoms to be a sign that something serious was happening physically (CBRQ: D) and resting to manage symptoms (CBRQ: R) were also significantly linked to time 1 anxiety. This is consistent with the findings of previous cross sectional studies which have linked anxiety to more severe perceptions of the illness and to emotion focused coping strategies (Knowles et al, 2011, Goodhand et al, 2012, Tribbick et al, 2015, Rochelle et al, 2012).

At 3 month follow up (Time 2), anxiety continued to show associations with unhelpful cognitive, emotional and behavioural responses with some similarities and differences apparent between groups. A lack of acceptance beliefs towards symptoms were a significant risk factor for anxiety at time 2 for both the UC and CD groups. This unhelpful cognitive response has been linked to anxiety in several long term conditions including chronic pain (McCracken et al, 1998) and chronic obstructive pulmonary disease (Uchmanowicz et al, 2006).

For the CD group, baseline anxiety, feeling ashamed of symptoms or worried about others opinions of them (CBRQ: EA), overdoing things on a good day when symptoms were minimal (CBRQ: AL), and avoidant and safety seeking behavioural responses to gastrointestinal symptoms were also significant predictors of anxiety at 3 month follow up (Time 2).

The cognitive behavioural model defines safety seeking behaviour as behaviour

which arises from the perception of serious threat and is carried out in order to avert the feared catastrophe. It is perceived as preventative by the individual and is focused on the imagined negative consequences of the threat. It is considered by the cognitive behavioural approach to be an important factor in the maintenance of anxiety disorders as it promotes a hypervigilance towards the feared event and prevents disconfirmation of threat related cognitions (Salkovskis et al, 1998).

Safety seeking behavioural responses to gastrointestinal symptoms which were found to increase the risk of anxiety at 3 month follow up (Time 2) in this study included strategies such as avoiding staying away from home overnight or frequently visiting the toilet and finding it unnecessary. According to the CBT model, these behaviours in combination with avoidant behavioural responses (e.g. always knowing the whereabouts of the nearest toilet) would be intended to prevent the occurrence of perceived shame or social judgement which is anticipated in responses to the occurrence of symptoms in public. Although a flare up in disease activity might have initially necessitated some of these responses such as staying home, once symptoms begin to subside this may be less useful as it maintains focus on the feared event, prevents a realistic appraisal of its occurrence and consequences and maintains anxiety. Engaging in excessive activity to get tasks finished when symptoms are at their least intrusive and perhaps least embarrassing would also make sense in this context. As anxiety has been associated with increased bowel frequency in several studies (Gorard et al, 1996), this may further cloud appraisals and maintain this fear.

For the UC group, baseline levels of anxiety (HADSA) and depression (HADSD), perceiving symptoms to be a sign that something serious is happening physically (CBRQ: D) and thinking a lot about these symptoms (CBRQ: SF), whilst resting to control them (CBRQ: R), increased the risk of being a case of anxiety at 3 month follow up (Time 2). According to the cognitive behavioural model of anxiety, the perception of symptoms being dangerous is likely to promote a hypervigilance towards them (Clark et al, 1999). Behavioural responses such as resting would represent attempts to minimise or control the danger and the anxiety experienced about it. The inactivity created by this behavioural response may be particularly unhelpful for mood as it provides further opportunity to focus on symptoms without distraction leading to further severe evaluations, more anxiety, more resting and so on. Furthermore, as behavioural withdrawal has long been associated with low mood in the wider psychological empirical literature and is considered to be a perpetuating factor for depression, this behaviour may link to and exacerbate baseline levels of depression (Ferster, 1973).

The findings of this study suggest that specific cognitive and behavioural responses to symptoms are linked to the experience and risk of developing anxiety for people with IBD. In addition baseline levels of anxiety and depression were identified as important predictors of subsequent anxious symptomology. No previous studies have utilised a cognitive behavioural model to explore the psychological factors linked to anxiety or included any element of follow up.

Depression

In this study the prevalence of cases of depression at baseline (Time 1) was 14% for the UC group and 12% for the CD group. At 3 month follow up (Time 2) it was approximately 20% for both groups. This is somewhat less than the lifetime prevalence rate of 27% reported in the empirical literature (Walker et al, 2008).

Cross sectional analysis identified that baseline cases of depression were associated with a range of unhelpful cognitive and behavioural responses which showed some similarity and variation by IBD type. After adjusting for clinical variables, time 1 cases of depression were significantly associated with a lack of acceptance beliefs towards symptoms (CPAQ) for both UC and CD groups. This psychological factor was also significantly associated with anxiety at baseline and at 3 month follow up for both groups. One previous study found a cross sectional association between acceptance towards the symptoms, engagement with valued activities and better emotional and social functioning in IBD (Kiebles et al, 2010).

Other unhelpful cognitive and behavioural responses were also linked to time 1 cases of depression but these varied by diagnosis. For the CD group feeling ashamed of symptoms and worried about others opinions of them (CBRQ: EA), thinking constantly about symptoms (CBRQ: SF), excessively resting to control them (CBRQ: R) and avoidant and safety seeking behavioural responses to

gastrointestinal symptoms (IBS-BRQ: A, S) were significantly associated with time 1 cases of depression.

The cognitive behavioural model of depression proposes that low mood is linked to extreme beliefs about personal loss and failure which leads to social withdrawal. This reduction in social activity is thought to perpetuate low mood by reducing the individual's exposure to situations which would usually provide a sense of pleasure and mastery and promote wellbeing (Beck et al, 1976). For the CD group, responding to feelings of shame about symptoms and worries about others opinions of them by resting or avoiding social situations may therefore be particularly unhelpful for mood in several ways. It is likely to prevent the individual from evaluating the accuracy of their perceptions pertaining to others reactions to their symptoms, maintaining feelings of shame and promoting further social withdrawal. The resultant lack of engagement in valued activities would then provide further opportunity to focus on symptoms and could maintain or exacerbate feelings of depression.

For the UC group, believing it to be unacceptable to experience negative emotions and express these to others (BeS) and excessive resting or napping to control symptom (CBRQ: R) were significantly associated with baseline depression. These findings suggest that dysfunctional assumptions about the self (BeS) rather than Illness specific cognitions are relevant to depression for this group. The cognitive behavioural model proposes that individuals who believe that anger, fear or sadness should not be experienced or shared may struggle when these emotions occur and may find it harder to seek support

from others. Unhelpful beliefs about emotions have been linked to negative adjustment outcomes in other long term condition including multiple sclerosis (Dennison et al, 2010). Further, the CBT model would hypothesise that the reduction in valued and stimulating activities brought about by resting behaviour may serve to reinforce low mood (Forester et al, 1973).

At 3 month follow up (Time 2) cases of depression were not associated with any of these illness specific cognitive, emotional or behavioural responses assessed at baseline for either group. The risk of being a case of depression at 3 month follow up was significantly increased by baseline anxiety and depression for both the UC and CD groups and with baseline poor health related quality of life for the CD group only. Initial disturbances to mood and health related quality of life are therefore significant risk factors for the development of subsequent depressive symptomology.

It is possible that the absence of any associations between psychological measures and time 2 cases of depression in this study are a result of the psychological concepts measured. These may have failed to capture the psychological processes pertinent to this mood disorder. Several studies have identified feeling misunderstood, stigmatised and alienated due to IBD symptoms to be associated with symptoms of depression (Jordan et al, 2017, Kemp et al, 2012, Taft et al, 2009). Further, low self-esteem and hopelessness have been linked to reduced emotional functioning in this population in two previous studies (Moreno-Jiménez et al, 2007, Petrak et al, 2001). Future

longitudinal studies may benefit from including measures focused on assessing stigma, hopelessness and dysfunctional assumptions related to the self.

General psychological distress

In this study the prevalence of cases of general psychological at baseline (Time 1) was approximately 30% for the UC group and 43% for the CD group. At 3 month follow up this had increased to 40% for the UC and 50% for the CD group. Previous studies have reported prevalence rates of approximately 30% (Dorrian et al, 2009).

At time 1 cases of general psychological distress were associated with a range of unhelpful cognitive, emotional and behavioural responses. For both groups, believing it to be unacceptable to experience and share negative emotions (BeS), a lack of acceptance beliefs towards symptoms (CPAQ) and thinking excessively about symptoms (CBRQ: SF) were important. For the UC group only, excessive resting to manage symptoms (CBRQ: R) and a tendency to overdo things on a good day (CBRQ: Al) were also significant. For the CD group feeling ashamed of symptoms (CBRQ: EA) and avoiding going out overnight or only doing so with spare clothes and a knowledge of the nearest toilet (IBS-BRQ: A, S) were additional factors linked to distress.

Baseline (Time 1) levels of anxiety (T1HADSA) and depression (T1HADSD) were significant risk factors for distress at 3 month follow up (Time 2) for both groups. Once again the prospective analysis identified baseline affective

symptoms to be important in the development of subsequent psychopathology. For the CD group, behavioural responses to managing symptoms (IBS-BRQ & CBSQ: AL) were also important predictors. For the UC group cognitive responses (CPAQ) were associated with an increased risk.

Previous studies that have explored the psychological factors associated with distress have not conducted separate analyses for UC and CD groups. At a cross sectional level, perceptions of stress, severe predictions about the consequences of IBD and behavioural disengagement have all been linked to general psychological distress (Dorian et al, 2009). Whether these associations vary across IBD type or are linked to an increase risk of distress over time has not currently been considered in the empirical literature. The findings of this study suggest that at 3 month follow up (Time 2), the risk of distress was significantly increased by baseline disturbance to mood for both groups; unhelpful cognitive responses in UC and unhelpful behavioural strategies for CD.

Health related quality of life

In this study, at baseline the prevalence of probable cases of poor health related quality of life was approximately 67% for participants with UC and 69% of those with Crohn's disease. This is consistent with previous studies that reported rates of 70% (Swart et al, 2013, Huaman et al, 2010). At 3 month follow up this had increased to 75% for the UC group and 88% for the CD group. This is somewhat higher then reported in the empirical literature.

At baseline after adjusting for significant sociodemographic and clinical variables, poor health related quality of life was associated with some unhelpful cognitive responses to symptoms; a lack of acceptance beliefs for both groups, thinking a lot about symptoms (CBSQ: SF) for the UC group and feeling embarrassed or ashamed about symptoms (CBRQ: EA) for the CD group. In addition, safety seeking behavioural responses to gastrointestinal symptoms such as checking stools for abnormalities (IBS-BRQ: S) and resting to control symptoms (CBRQ: R) were also significantly associated with this outcome for the CD group. Once again behavioural responses were found to be more important for negative adjustment outcomes for the CD group. These findings are largely consistent with the results of previous cross sectional studies that have found associations between poor health related quality of life and more severe illness perceptions and emotion focused coping strategies (Guthrie et al, 2002, Turnball et al, 1995).

At 3 month follow up, poor health related quality of life was not significantly associated with any cognitive, emotional or behavioural responses measured at time 1 for the UC group. For the CD group, baseline levels of depression and health related quality were found to be risk factors for poor quality of life in the prospective analysis.

Overall these findings highlight the importance of implementing psychological interventions for improving initial disturbances to mood for people with IBD as, if left untreated, this may become a significant risk factor for the subsequent development of negative adjustment outcomes.

Strength of associations

The magnitude of association between significantly associated cognitive, emotional and behavioural factors assessed at baseline and baseline cases of anxiety, depression, general psychological distress and poor quality of life for both the UC and CD group were largely similar. The strongest association was identified between baseline cases of anxiety and symptom focusing for the UC group with an odds ratio of 1.34.

In the prospective analysis the strength of association between significantly associated psychological factors assessed at time 1 and time 2 cases of anxiety, depression, distress and poor quality of life were generally higher for the UC group. Baseline levels of anxiety (OR 1.40) and depression (OR 1.60), damage beliefs (OR 1.60) and symptom focusing (OR 1.55) were particularly strong predictors for cases of anxiety at 3 month follow up for the UC group. The only exception identified was the association between baseline depression and poor quality of life for the CD group which had an odds ratio of 1.63. Overall baseline disturbances to mood showed the strongest and most frequent associations with negative adjustment outcomes at 3 month follow up. This reiterates the benefits of early psychological intervention to improve mood in IBD.

Clinical implications for improving adjustment outcomes for people with IBD.

The findings of this study could be useful for identifying individuals that may be at risk of developing future mood disorders. For example it may be possible to

target psychological interventions at those individuals who begin to become preoccupied with their symptoms or who rest excessively to manage them, as well as those already exhibiting disturbance to mood. In contrast to sociodemographic or disease related factors, cognitive and behavioural responses are potentially modifiable through psychological interventions. The results of this study give a preliminary indication of potential areas to focus on within such an intervention with the aim of improving psychosocial adjustment outcomes. This is particularly important for people with IBD as anxiety and depression have been found to be independently associated with clinical recurrence (Mikocka-Walus et al, 2016).

Given the overlap in cognitive, emotional and behavioural responses associated with the range of negative adjustment outcomes examined in this study, a transdiagnostic or third wave CBT approach such as acceptance and commitment therapy (ACT) may be best suited to treating emotional distress in this population. Transdiagnostic cognitive behaviour therapy (TD-CBT) targets the shared cognitive and behavioural processes underlying the development and maintenance of anxiety and low mood (Clarke & Taylor, 2009). As a consequence it is arguably a more efficient way to deal with patients who are presenting multiple clinical problems (Mansell et al, 2008). A recent meta-analysis which included 24 RCT's found that transdiagnostic CBT treatments outperformed control conditions for reducing anxiety and depression and improving quality of life (Newby et al, 2014).

It is possible that the nature of IBD symptoms means that it may be difficult to modify some illness specific cognitions with a transdiagnostic CBT approach. For example, an IBD symptom such as diarrhoea is a result of inflammation of the intestines. Believing that the severity of symptoms indicates that something serious is going on physically may therefore be a reasonably realistic appraisal in some instances. In addition a lack of acceptance beliefs towards symptoms and unhelpful behavioural responses to gastrointestinal symptoms were important across outcomes. Unlike transdiagnostic CBT in which strategies aim to change the content of the unhelpful belief, a third wave CBT approach such as acceptance and commitment therapy (ACT) aims to change a person's relationship and response to the belief. This approach focuses on reducing the behavioural and functional influence of thinking and seeks to foster a general process called psychological flexibility. This is defined as being open, aware and in contact with the present moment, and flexibly engaging in behaviours which facilitate overarching life goals. In essence ACT does not seek to alleviate the distress experienced about symptoms but instead it aims to increase an individual's ability to undertake meaningful activity in its presence. ACT uses a range of methods to engender psychological flexibility, such as mindfulness exercises to enable one to be present-moment-focused, defusion exercises to change one's relationship with thoughts, and values elicitation exercises to orientate participants to activities which are in line with personally meaningful values (McCracken, 2011). For example, a person would be encouraged to notice their feelings of shame and anxiety about symptoms and the avoidance of social situation to which this leads. Mindfulness practice would be utilised to encourage present moment awareness and to foster a non-judgemental acceptance towards these

unwanted thoughts and feelings. Personal values would be identified and the person would be encouraged to commit to taking action in pursuit of these values in the presence of unhelpful thoughts or sensations (Graham et al, 2016). ACT has been applied across many long-term conditions, including cancer (Feros et al, 2013), multiple sclerosis (Nordin & Rorsman, 2012) and diabetes (Gregg et al, 2007). It has been found to reduce distress (Nordin & Rorsman, 2012) and improve quality of life (Feros et al, 2013).

Limitations and future directions

Validated self-report measures were used in this study to assess symptomatic disease activity and symptoms of anxiety and depression. Objective measurements of mood through structured clinical interview and disease activity via endoscopy and faecal calprotectin analysis may give a more robust indication of these factors, given that distress may act as a confounder and lead to inflated reporting of this phenomenon.

It is unlikely that this study was subject to selection bias as participants were not selected in relation to the exposure or outcomes of interest. This study employed a convenience sample recruited from an outpatient clinic and patient organisation. An advantage of this type of sampling is that it is less open to selection bias because the participants are likely to be less selected than in randomised controlled trials (Bowling A, 2009).
Cohort studies can be subject to attrition bias due to differences between participants who did and did not complete the follow-up period. However, the response rate for this study was greater than 75% and baseline socio-

demographic and clinical variables were similar between the two groups. Also there were no statistically significant differences between groups on the majority of baseline measures of psychological variables, except that participants who completed time 1 & time 2 measures (study completers) had higher mean scores for embarrassment avoidance and damage beliefs on the cognitive behavioural response scales (Song et al, 2010).

Logistic regression was the method of analysis used in this study. This was effective for demonstrating the size of effect. However, due to the binary outcome, the extent of the effect may be concealed and some information contained in the continuous outcomes may have been lost. Further, a cut off score of 11 or more on the HADSA and HADSD was utilised to indicate moderate cases of anxiety and depression in the analysis. The results may have varied if a score of 7 or more had been employed to delineate mild cases. This may also have been the case if different cut off scores had been used for distress and poor quality of life.

Due to concerns about collinearity, psychological factors were not entered collectively into a multivariable model for each outcome across time points. It was therefore not possible to assess which predictor variables were most important for negative adjustment outcomes, nor which predictors were redundant in the presence of others. Each psychological factor was however entered into its own model for each outcome, which was adjusted for relevant sociodemographic and disease related factors. It was therefore possible to identify the psychological factors which remained significant when taking those factors into consideration (Bland, M, 2009).

Additional longitudinal studies are required to further assess the psychological risk factors for anxiety, depression, distress and poor quality of life for people with IBD. Such studies would benefit from a longer follow up period, over which repeated assessments of outcomes could take place. The relatively short time-line between baseline and follow up in this study may have left little time for change and processes that are truly explanatory may not have become clear. Where possible, objective measures of disease related factors and of mood should be utilised to provide more robust data on the associations between these factors. In this study, data on the age at which participants were diagnosed with IBD was collected. In retrospect it may have been more useful to assess the length of diagnosis, as a new diagnosis has been linked to anxiety in UC in a previous study (Goodhand et al, 2012). In this analysis however, age of diagnosis was not associated with any outcomes at time 1 or time 2.

In this study, illness specific cognitive and behavioural responses were not linked to an increased risk of depression at 3 month follow up. Future longitudinal studies exploring the psychological risk factors linked to depression for people with IBD would benefit from assessing a wider range of variables focused on hopelessness, stigma and self- esteem (Moreno-Jiménez et al, 2007, Petrak et al, 2001).

5.6: Conclusion

To date this is the first study which has utilised a prospective design to explore the associations between illness specific cognitive and behavioural responses

and negative adjustment outcomes. The findings pinpoint the differing cognitive, behavioural and emotional responses to IBD, which increase the risk of developing disturbances to mood and health related quality of life. The results suggest different psychological factors may need to be targeted in a psychological intervention for different outcomes and for different IBD types. A third wave CBT approach, such as acceptance and commitment therapy (ACT) may be best suited to treating disturbances to the process of adaption in IBD, given the nature of the cognitive and behavioural responses identified as risk factors for the majority of outcomes.

Chapter 6: Cognitive behaviour therapy for distress in people with Inflammatory Bowel Disease: A bench marking study

This chapter is published in Clinical psychology and psychotherapy (Full reference below). Presented here is the authors accepted manuscript version of the paper.

Statement of contributions: I generated the idea for this study which in conjunction with TC was developed into a study protocol. I planned and executed the study, collected the data, carried out the analysis. TC assisted with the interpretation of the data and drafting and revising this paper.BH contributed to revising the write up of this study.

Reference: Cheryl Jordan, Bu 'Hussain Hayee & Trudie Chalder, (2018). Cognitive behaviour therapy for distress in people with Inflammatory Bowel Disease: A bench marking study. Clinical psychology and psychotherapy (Accepted).

6.1: Abstract

Objective: Anxiety and depression are common in inflammatory bowel disease (IBD) and have been linked to clinical recurrence. Previous randomised controlled trials have found no evidence that psychological interventions enhance outcomes for people with IBD but have recruited patients without distress. This study investigates the clinical benefits of a non-randomised uncontrolled study of clinic based cognitive behaviour therapy (CBT) for people with IBD who had moderate to severe levels of anxiety or low mood and compares the results to a previous randomised controlled trial of CBT in this population.

Method: Assessments were completed at baseline and end of treatment and included measures of low mood, generalised anxiety, quality of life and symptomatic disease activity. The patient health questionnaire and generalised anxiety disorder 7 measures were the primary outcomes. Results in the form of a standardized effect size of treatment were compared with a previous randomised controlled trial to consider if CBT had greater benefits for those with distress.

Results: Thirty patients were deemed appropriate for CBT and twenty eight accepted treatment. The results from this clinic based CBT intervention suggest statistically significant reductions in symptoms of anxiety (<0.001), low mood (<0.001) and disease activity ($p<0.01$) and increases in quality of life ($p<0.001$).The uncontrolled effect sizes were large and superior to those found in published RCTs.

Conclusion: This nonrandomised uncontrolled trial of a clinic based CBT intervention suggests CBT may have benefits for those with moderate to

severe disturbances to mood and that effect sizes can be improved by targeting those with distress. RCTs are required to establish efficacy.

Keyword: Cognitive behaviour therapy, inflammatory bowel disease, Anxiety, Low mood.

6.2*:* Introduction

The two most common types of inflammatory bowel disease (IBD) are Crohn's disease (CD) and ulcerative colitis (UC). Both conditions are associated with a similar range of unpleasant and incapacitating symptoms which include diarrhoea, fatigue and pain in the abdomen. In UC, this is the consequence of inflammation which is usually restricted to the colon where as in CD any part of the intestines can become affected. Extra intestinal symptoms can also occur, the most common being anaemia (Stein et al, 2010). The course of IBD is changeable and episodic in nature. Its precise aetiology remains elusive and there is currently no conclusive cure. Current IBD treatments target the inflammatory response during flare episodes with regular medication to maintain remission (Kiebles, et al, 2010).

People with IBD are at increased risk of developing anxiety and depression. The empirical evidence demonstrates the life time prevalence rates of these emotional disorders to be as high as 35.8% (Walker et al, 2008). Anxiety and depression are independently associated with clinical recurrence (Mikocka-Walus et al, 2016) and have been linked to increased inflammation (Maunder et al, 2008). Further, psychological distress in IBD can be influenced by disease related factors such as relapses, as well as general psychological factors. A recent systematic review found that emotion focused coping strategies, extreme perceptions of the illness and of being stressed were significantly associated with worse mental health outcomes, and this was maintained when controlling for the influence of disease related variables (Jordan et al, 2016). Psychological factors are potentially modifiable through psychological interventions and consequently interest in the possible efficacy of

psychological interventions to improve outcomes in IBD has increased (Knowles et al, 2013).

Several reviews have been published which have examined the impact of psychotherapy on biopsychosocial outcomes for people with IBD (Gracie et al , 2017, Knowles et al, 2013, McCombie, et al, 2013, Timmer et al, 2011). A Cochrane meta-analysis of randomised controlled trials (RCTs) concluded that there was no evidence that psychological interventions enhanced emotional states, quality of life (QOL) or reduced disease activity in the short term or at 12 months in unselected adults with IBD. It did though suggest that psychotherapy may benefit subgroups of patients with emotional needs and recommended future research should evaluate this (Timmer et al, 2011).

A major problem associated with the RCTs included in the Cochrane meta-analysis is that 19 out of 20 studies included adult patients without distress at the start. Mean scores for mood measures indicated that participants had symptoms in the sub clinical range. This is likely to have significantly reduced any potential treatment effects as participants generally had good mental health (Timmer et al, 2011).

Two trials published subsequently comparing group and computerised cognitive behaviour psychotherapy (CBT) with treatment as usual have continued this trend (Mikocka-Walus et al, 2015, McCombie et al, 2016). Their findings confirm that the impact of CBT is limited for those without disturbance to mood. However, post hoc sub group analysis conducted by Mikocka-Walus et al, (2015), found CBT had a greater impact for participants who had higher

scores for anxiety and low mood at baseline. It seems intuitively sensible to target the group with most clinical need (Timmer et al, 2011), as improvements in mood may ultimately alleviate the aspect of disease activity which is linked to or driven by psychological distress.

As yet the impact of a clinic based CBT intervention on biopsychosocial outcomes for people with IBD and anxiety and low mood has not been evaluated or considered in relation to the findings of RCTs. This study will therefore evaluate whether a clinic based CBT intervention for people with IBD and moderate-severe anxiety or low mood shows promise. We think it is likely that by targeting those patients with moderate to severe low mood or anxiety that significant changes will be observed in the primary outcome measures. We will then compare the results of this open study to previous RCT results. The treatment location for this study was a newly developed CBT service which was established as an adjunct to usual IBD treatment and care. It was one of the first of its kind to be located within an inflammatory bowel disease service in the UK. As CBT has proven efficacy for improving mood in other long term conditions, randomly withholding this intervention from patients with significant emotional distress in order to evaluate its efficacy under gold standard RCT conditions raised ethical issues (Harris et al, 2006). We therefore employed a pragmatic approach to investigating the benefits of a clinic based CBT intervention and utilised a non-randomised uncontrolled trial design.

Benchmarking is a useful way of measuring the effectiveness of a clinic based intervention against clinical trials and can provide a direct statistical comparison of pre-post treatment scores (Minami et al, 2008). Often

treatment effects are more modest outside of RCT conditions due to for example, lower criteria for inclusion. However given that trials to date have included those without clinical levels of distress and a clinic based intervention focuses on patients with poor mental health, this may not be the case for IBD.

It is important when carrying out a benchmarking study that the treatment location that is being compared to an RCT condition represents a real practice setting. Shadish, et al (1997) and Shadish, Matt, Navarro, and Philips (2000) have developed a set of criteria that can be used to assess the extent to which a setting is clinically representative. These criteria include; representativeness of problems, the setting, how referrals are sourced, representativeness of therapists, structure of service, monitoring of treatment, problem heterogeneity and also pre therapy training, ability to have therapy freedom and use of multiple techniques and flexibility of number of sessions. The CBT clinic which provides the setting for this study fulfilled the majority of the Shadish criteria.

Within the mental health literature, benchmark studies have been produced for CBT for anxiety and depression (Westbrook & Kirk, 2005), chronic fatigue syndrome (CFS) (Quarmby et al, 2007), social phobia (Gaston, et al, 2006), panic (Stuart et al, 1998), post -traumatic stress disorders (Gillespie et al, 2002) and multiple sclerosis (MS) (Askey Jones et al, 2013).These studies revealed comparable effect sizes between RCTs and outpatient clinics. To date there have been no studies comparing results from RCTs of CBT for people with IBD with outcomes achieved with a clinic based CBT intervention focused on those with clinically significant distress. Given the results of previous trials it is

important to evaluate whether a psychological intervention could help those in need. We therefore report on the clinical impact of a clinic based CBT intervention for people with IBD who had moderate to severe levels of anxiety or low mood and 2) compare the results to a previous randomised controlled trial (RCT) of CBT in this population. We hypothesise that levels of anxiety and depression will reduce after the clinic based CBT. In addition we hypothesise that the effect sizes after clinic based CBT will be superior to the effect sizes in the comparison RCT.

6.3: Method

Study design

We used a nonrandomised uncontrolled trial to evaluate the impact of a clinic based CBT intervention for people with IBD who have moderate to severe levels of anxiety and/or low mood. We then compared outcomes with the results from an RCT of CBT. The aim of the CBT in the RCT was to prolong remission and improve quality of life and psychological distress in adults with IBD (Mikocka- Walus et al, 2015). Table 6.0 provides details of the methods employed by the comparison study. We utilised the transparent reporting of evaluations with nonrandomised designs checklist (TREND) to structure the reporting of this study and to ensure clarity (Des Jarlais et al, 2004).

Materials and Procedure

CBT clinic & Participants

The CBT clinic was located within a gastroenterology outpatient department in the UK. Patients were taken from consecutive referrals from the clinical team

of gastroenterologists and IBD nurse specialists. Team members were encouraged to use the patient health questionnaire 9 (PHQ9) (Spritzer et al, 1999) and generalised anxiety disorder 7 measure (GAD7) (Spitzer et al, 2006) to screen for symptoms of low mood and anxiety to assist their clinical judgements. People scoring 10 or over on either or both measures (moderate to severe levels of anxiety and/ or low mood) were referred. Most reported difficulty in dealing with or adjusting to an aspect of their diagnosis of IBD or perceived their emotional stress to play a significant role in their experience of disease activity.

Table 6.1: Basic CBT demographics.

	Clinic based CBT intervention	**Clinic based CBT intervention**	**RCT**
Method	Nonrandomised trial of clinic based CBT	Nonrandomised trial of clinic based CBT	Online CBT Vs TAU
Trial author & year of publication	Jordan et al, 2018.	Jordan et al, 2018.	MIkocka-Walus et al, 2015.
No in CBT arm of trial	Complete sample n=30	Analysed sample n=27	n=68 baseline n=35 6months
Age, years, M (SD)	38.67 (range 21-68, SD 13.1)	37.4 (range 21-68, SD 12.6)	NR for online CBT group
Gender N (%) **Female** **Male**	 21 (70) 9 (30)	 19 (70.4) 8 (29.6)	NR for online CBT group.
Ethnicity N (%) **White** **Black** **Other**	 27 (90) 3 (10) 0	 25 (92.4) 2 (7.4) 0	NR for online CBT group
Type of IBD N (%) **CD** **UC**	 16 (53.3) 17 (46.7)	 12 (44.4) 15 (55.6)	NR for online CBT group.
Duration of illness **M, (range)**	 5.72 (1-20)	 5.57 (1-20)	NR for online CBT group
Marital status N (%) **Married** **Divorced** **Single**	 13 (43.3) 1 (3.3) 16 (53.3)	 11 (55.6) 1 (3.7) 15 (55.6)	NR for online CBT group

TAU=Treatment as usual, F2F= Face to face, NR=Not reported, CBT=cognitive behaviour therapy

The psychological therapist provided transdiagnostic cognitive behaviour therapy (TD-CBT) for the treatment of anxiety and low mood. This approach targeted the shared cognitive and behavioural processes underlying the development and maintenance of emotional distress (Clarke et al, 2009). It did not require the therapist to determine a primary diagnosis i.e. depression or an anxiety disorder, as is the case with disorder specific CBT. As a consequence it was arguably a more efficient way to work with patients who were presenting with multiple clinical problems (Mansell et al, 2008). A recent meta-analysis which included 24 RCTs found that transdiagnostic CBT treatments outperformed control conditions for reducing anxiety and depression and improving quality of life (Newby et al, 2014).

Routine outcome data was collected in the CBT clinic between November 2014 and September 2016. Unlike previous RCTs, only patients with clinically significant symptoms of anxiety and low mood were referred to the CBT clinic. In addition patients were not excluded if they were experiencing symptomatic disease activity. However patients were excluded if they had cognitive impairment or were unable to speak English to a standard required to engage meaningfully in the therapy. Table 6.1 provides details of the inclusion and exclusion criteria employed in the CBT clinic and the comparison study. The CBT clinic met the majority of Shadish's et al, (1997) criteria for clinical relevance. Patients were all clinically referred and heterogeneous in age, sex, and focal problem. Although the approach was consistent with a transdiagnostic approach for anxiety and depression there was no written manual, no monitoring of treatment other than routine supervision, the therapist did not participate in any specific training for the purposes of the

study and there was flexibility in the number of sessions offered to patients. However, the therapist was a trained and experienced cognitive behavioural therapist.

Table 6.2: Inclusion and exclusion criteria

	Clinic based CBT intervention	*Mikocka –Walus et al, 2015.*
Inclusion criteria	1) Individuals over aged 18 with a clinically established diagnosis of IBD 2) Moderate to severe symptoms of anxiety and/or low mood indicated by scores of 10 and over on GAD7 and/or PHQ9	1) Individuals over 18 with a clinically established diagnosis of IBD 2) Current clinical remission or mild symptoms only for at least 3 months 2) Sufficient English to understand, answer questionnaires and participate in therapy 3) Competence to consent 4) Willingness to complete CBT sessions.
Exclusion criteria	1) Cognitive impairment or unable to speak English to a standard required to engage meaningfully in the therapy	1) Serious mental illness (e.g. psychosis, schizophrenia) or alcohol/substance dependence as diagnosed by the Clinical psychologist 2) Currently undergoing psychotherapy 3) Significant cognitive impairment
Recruitment strategy	Consecutive referrals from gastroenterologists /IBD nurse specialists	IBD databases at two gastroenterology clinics in Australia were screened by the clinics' IBD nurses. Potentially eligible IBD patients were then contacted by letter

Audit Approval

Advice was sought from the local ethics committee. As the study was part of routine clinical outcome collection ethical approval was not required. However we received audit approval from the gastroenterology directorate to collect clinical outcomes for common mental health problems in IBD. Informed written consent was obtained from all individual participants included in the study. The privacy rights of participants were observed and data was pseudonymised and held in a secure place.

Procedure and treatment

Once referred to the CBT clinic by the IBD nurse specialists or gastroenterologists, all patients were asked to sign a consent form confirming they were agreeable to having their data recorded and used anonymously for any future papers following service evaluation. All participants consented to this. The therapist provided an initial assessment of all referrals and asked patients to complete self- report questionnaires. Following the initial assessment patients were offered TD-CBT if appropriate. This approach is based on traditional CBT principles with a particular emphasis on helping people change the way they respond to their emotions. A range of TD-CBT strategies were utilised in sessions to target the common psychological processes underlying anxiety and depression, rather than targeting the symptoms of the specific disorders. Strategies included psychoeducation to introduce the main components of an emotional experience, namely thoughts, physical sensations and behaviour and the reciprocal relationships between these domains. This three component model was then employed across sessions to recognise and track emotional experiences. This enabled the

patient to understand their cognitive, behavioural and emotional responses to triggers and assess the short and long term consequences of their emotion driven behaviour. Where behaviour was identified as unhelpful, patients worked towards acting in alternative ways. For example, a patient may have identified that when traveling on trains they experienced anxiety about having access to a toilet and their response was to stay close to a toilet during the journey and monitor and time its occupation. On consideration, they may have recognised that this behaviour maintained attention and focus on the feared event and amplified their anxiety. An alternative response might therefore be to sit slightly further away and focus attention on a more neutral activity thus lessening preoccupation and anxiety. Mindfulness and attention training exercises were employed to encourage such present focused awareness and to support the development of alternative adaptive emotional responses. Further, to encourage flexibility in thinking patients were taught to identify and evaluate maladaptive automatic appraisals as well as identify and overcome emotional avoidance. Therapy concluded with relapse prevention whereby patients were encouraged to identify goals to maintain treatment gains and for continued progress (Barlow et al, 2011). The treatment received was not manualised, but was instead based on individual case formulations. Therapy was undertaken on 1:1 basis, weekly for 50 minutes. The amount of sessions offered varied and was determined by the severity of the clinical problem and the individual's response to the intervention. We used the Template for intervention Description and Replication (TDieR) checklist (Hoffman et al. 2014), to promote completeness in reporting and replicability of the intervention, please see appendix 6.

Training and supervision

The therapist was trained in cognitive behavioural psychotherapy at a post graduate level with 15 years' experience of working with anxiety disorders and depression. Supervision was provided by a cognitive behavioural psychotherapist familiar with IBD (TC) on a monthly basis and consisted of face to face case supervision. The therapist had experience of working with people with IBD and anxiety and depression and this was consolidated by spending time with the IBD nurse specialists and gastroenterologists to gain further insight into the biopsychosocial impact of IBD.

Outcome measures

During the initial appointment demographic information (such as age, gender, marital status) as well as type of IBD, length of diagnosis, current medications and previous psychiatric history was elicited from participants. The clinical service collected routine data from all participants seen over a two year period (November 2014 and September 2016).

Primary outcomes

We chose two primary outcomes, anxiety (generalised anxiety disorder 7 (GAD7) and low mood (patient health questionnaire (PHQ9) as both were being targeted in the transdiagnostic treatment. The GAD7 is a self- report questionnaire which measures symptom severity for the four most common anxiety disorders (generalised anxiety disorder, panic disorder, social phobia and post- traumatic stress disorder). Scores in the 10-14 range are indicative of a moderate level of symptoms, whilst 15 and above implies severe (Spitzer et al, 2006). Symptoms of low mood were measured by the patient health

questionnaire, a multiple choice self -report inventory (PHQ9). Scores in 10-19 range signpost moderate to moderately severe symptoms of low mood, a score of 20 or more severe (Spritzer et al, 1999). Both of these measures are widely used to screen for clinically significant levels of symptoms within general medical and outpatient settings and to monitor treatment response over time (Spitzer et al, 2006). All patients completed these measures at pre therapy and immediately at the end of therapy.

Secondary outcomes

We selected two secondary outcomes, health related quality of life and symptomatic disease activity. As these outcomes are associated with anxiety and low mood we hypothesised that improvements to mood may lead to improvements in these domains. Health related quality of life was quantified by the short inflammatory bowel disease questionnaire (SIBDQ) which measures this construct across the 3 domains of physical, social and emotional status. Scores range from 10-70, with higher scores indicating a better quality of life (Irvine et al, 1996). Current levels of symptomatic disease activity were measured by the Harvey Bradshaw Index (HBI) (Harvey et al, 1980), for participants with Crohn's disease and the Simple Clinical Colitis Activity Index for participants with ulcerative Colitis (SCCAI) (Walmsley et al, 1998). The score derived from the HBI is based on 5 items that assess general well-being, abdominal pain, number of liquid stools per day, abdominal mass, and complications or extra intestinal manifestations. The score derived from the SCCAI is based on 6 items that assess daytime and night time bowel movements, urgency, and presence of blood in the stool, general well-being, and extra intestinal manifestations. Scores of <5 on the HBI and <3 on SCCAI

are considered to suggest remission (Higgins et al, 2005). All patients completed these measures at pre therapy and immediately at the end of therapy.

Statistical analysis

Statistical analysis was performed using the statistical package for the social sciences (SPSS) version 23. Descriptive statistics were generated to describe the study population The pre and post measures of health related quality of life (SIBDQ) and disease activity (HBI & SCCAI) for all participants were analysed using the paired t-test. The Shapiro-Wilks test for normality indicated that data may be skewed for post measures of anxiety (GAD7 W=.053 df=27 p=0.01) and low mood (PHQ9 W=.758 df=27 p=0.001) so the two sample Wilcoxon rank sum (Mann Whitney) test was used for analysis. The one drop out was not included in the analysis as post therapy measures had not been completed at the time of leaving the service.

Benchmarking & comparison of effects

A systematic review of psychological interventions for adults with IBD (Knowles et al, 2013), identified five studies investigating the effect of CBT focused interventions on clinical disease parameters as well as anxiety, low mood, disease related concerns and quality of life (Mussell et al, 2003, Kaneko, 2009, Schwarz et al, 1990, Diaz Sibaja et al, 2007, longhorst et al, 2007). Subsequently two further trials have been published (Mikocka-Walus et al, 2015, McCombie et al, 2016). None of these studies included participants with IBD who report clinically significant symptoms of anxiety or low mood either through structured clinical interview or validated measurement tools, although

these domains have often been evaluated as secondary outcomes (Fiest et al, 2016). There is also considerable variation across studies regarding the content of the intervention, as CBT was often used in combination with other strategies.

In order to create a benchmark we therefore selected studies that investigated a 1:1 intervention which was informed by a cognitive behavioural paradigm (including Computerised CBT, (CCBT) for people with IBD and that reported pre and post mean scores and standard deviations for measures of either anxiety, low mood or quality of life, as well as disease activity. This led to the exclusion of three studies which failed to report outcomes in the required format (Kaneko, 2009, Schwartz et al, 1990, McCombie et al, 2016) and three which evaluated a group intervention (Mussell et al, 2003, Diaz Sibabja et al, 2007, longhorst et al, 2007). The one remaining study consisted of two interventions (group CBT and online CBT) tested against standard care (Mikocka-Walus et al, 2016) (See table 6.2). For the purpose of this study only the outcome data from the online CBT condition was used (Mikocka-Walus et al, 2016) (since the CBT clinic only included an individual CBT treatment group) to compose a benchmark indexing the mean change of CBT under RCT condition.

Details of the recruitment strategies and inclusion/exclusion criteria utilised in the RCT study ((Mikocka-Walus et al, 2016) which composed our benchmark are reported in table 6.1. Primary outcomes included symptomatic disease activity measured by the Crohn's disease activity index (CDAI) (Best, 1976) and simple clinical colitis activity index (Walmsley et al, 1998). Secondary outcomes

considered were anxiety and low mood measured by the Hospital anxiety and depression scale (HADS) (Zigmond et al, 1983).

As it is not possible to directly compare these differing outcome measurements, uncontrolled effect sizes for each of these outcomes were calculated to standardize the treatment effects (Streiner, 1991). Such an uncontrolled effect size is likely to inflate the effects of therapy as compared to a conventional controlled effect size, because it effectively assumes that there would be no change without therapy. It does however provide a crude benchmark for comparison with other studies. Uncontrolled effect sizes were calculated as (*M* Start _ *M* End) / *SD* Start) (Cohen, 1988; Westbrook et al, 2004). As outcomes were reported at multiple time points (e.g., post treatment and follow-up), we calculated the effect size with the outcome closest to the time interval of the clinical service which was 6 months. Conventionally effect sizes are classed as 0.2 (small), 0.5 (medium) and 0.8 (large).

6.4: Results

Number of sessions, attrition and drop out.

The mode number of CBT sessions received was six (range 4-10, mean 6.70, SD 1.68). Of the 36 patients screened; 30 were eligible for CBT. Two declined treatment due to being unable to attend the appointments slots offered. Of the remaining 28, 27 completed therapy and 1 dropped out of treatment. The reason given for this was that the participant changed employment and was no longer able to attend the clinic (See fig. 6.1). On inspection there were no differences in gender ($\chi 2$= 2.19 pr=0.139), ethnicity ($\chi 2$ =3.11 pr=0.375) or

marital status ($\chi 2$=0.6710 pr=0.715) between starters and non-starters of therapy.

Baseline severity of anxiety, low mood, quality of life and disease activity.

The majority of participants presented with moderate to severe levels of anxiety and low mood (n=20 scored 10 and above on PHQ9 & GAD7). On inspection there were no differences between starters (n=28) and non -starters (n=2) of therapy on baseline scores for the SIBDQ (t (28) =2.81 p=0.08), GAD7 (z=-0.67 p=0.31) or PHQ9 (z=-1.17 p=0.29).

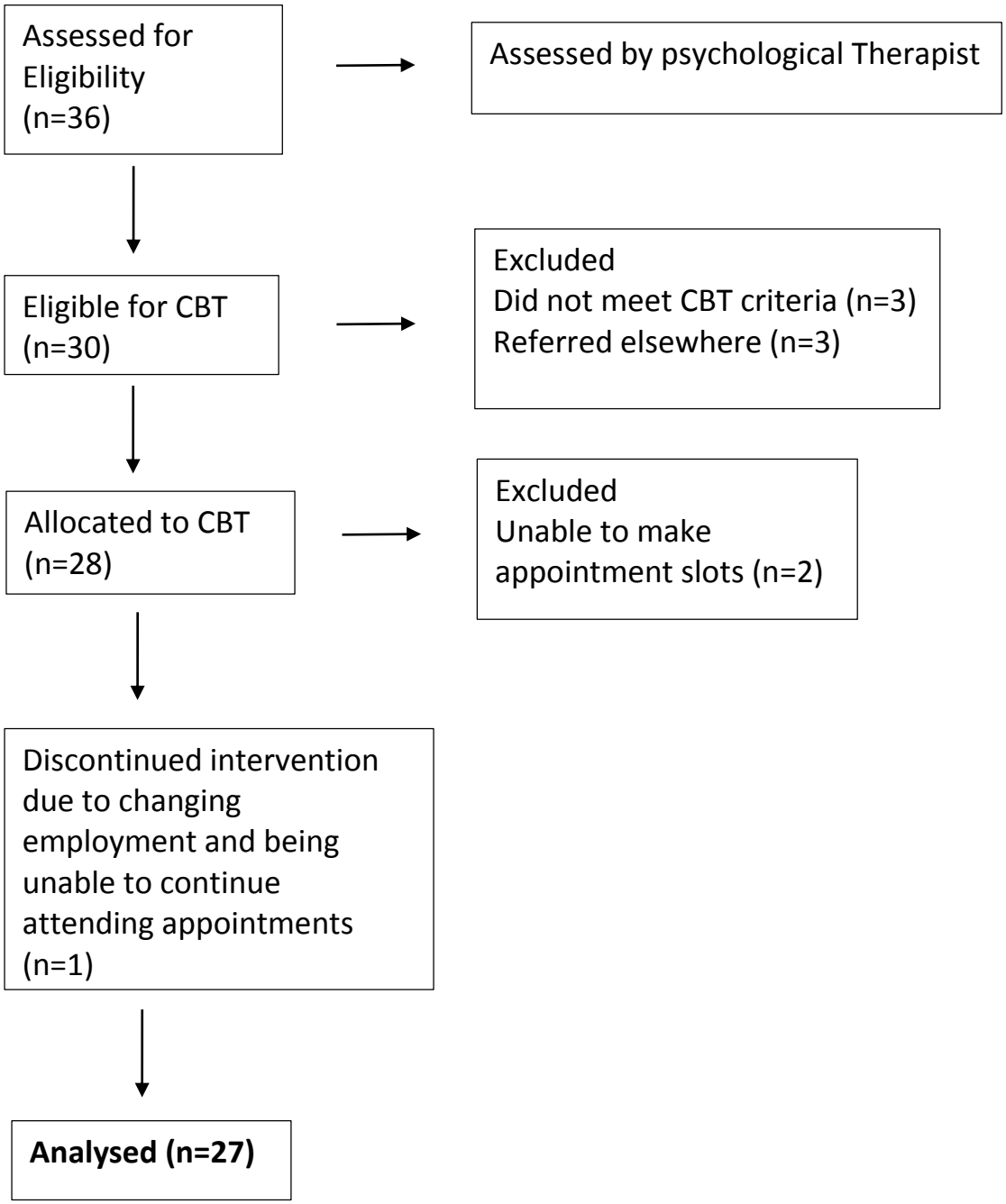
Further analysis Indicated that 65% of the participants with Crohn's disease scored <5 on HBI and 66% of participants with ulcerative Colitis scored <3 on SCCAI which suggests the majority of participants were experiencing a remission in disease activity.

Treatments outcomes

Analyses were conducted on 27 people who had completed pre and post scores on the PHQ9, GAD7, SIBDQ and either the HBI for Crohn's disease or SCCAI for Ulcerative Colitis, at base line and end of therapy. There was a statistically significant decrease in scores for low mood on the PHQ9 from time 1 (M 13.44, 5.31) to time 2 (M 3.44 SD 2.23, Z=.000 p<0.001). Statistically significant decreases in anxiety scores on the GAD7 were also observed from time 1 (M 12.67 SD 4.67) to time 2 (M 3.22 SD 2.55, z=.000, p<0.001). In addition statistically significant decreases in symptomatic disease activity were observed for Crohn's disease on the HBI from time 1 (M 7.00 SD 3.95) to time 2 (M 4.25 SD 3.19, t (25) =4.01 P=0.002) and ulcerative colitis on the SCCAI at

time 1(M 4.93 SD 2.46) to time 2 (M 2.27 SD 1.79, t (25) =4.28 P<0.001). Finally statistically significant increases in scores for quality of life on the SIBDQ were detected from time 1 (36.22 SD 9.01) to time 2 (M 55.04 SD 6.39 t (25) =-14.65 p<0.001).

Figure 6.1: Modified Consort flow diagram for recruitment to the CBT clinic



Benchmark comparison

Uncontrolled effect sizes comparing the CBT clinic and the RCT self- report outcome scores are provided in table 6.2. Overall the mean effect sizes reported from the RCT for low mood, anxiety and symptomatic disease activity were small to medium (0.2-0.5) whilst for the CBT clinic large mean effect sizes were observed for these outcomes (close to or over 0.8).

6.5: Discussion

The results indicate that CBT may be of benefit for people with IBD and clinically significant emotional distress. Scores on measures of anxiety, low mood and disease activity significantly decreased over the course of the study whilst scores for quality of life significantly increased.

The treatment effects of CBT on all outcomes for people with IBD compared to the RCT were favourable. This is likely to be due to the inclusion of participants with moderate to severe symptoms of anxiety and low mood. These findings suggest that it is this sub group of patients with significant levels of distress who benefit most from psychological intervention. The results of the majority of previous RCTs suggest that CBT has limited effect on self-reported disease course for people with IBD without disturbance to mood (Gracie et al, 2017). Based on our findings, future RCT's may show improved disease related outcomes if participants with clinically significant symptoms of anxiety and low mood are recruited. As mood improves it may be that inflammation is reduced in combination with a shift in symptom perception. In contrast, as mood worsens reports of disease activity may increase and vice versa. This reciprocal interaction is likely to be mediated by cognitive, behavioural and emotional

responses. Our findings suggest that by identifying and addressing unhelpful responses with cognitive behaviour therapy both mood and reports of disease activity may improve (Jordan et al, 2016).

Table 6.3: Mean scores at pre & post treatment and effect sizes for the CBT clinic and the RCT

Name of trial authors	**CBT clinic.**	**Mikocka –Walus et al, (2015).**
CBT type	Individual	CCBT
Pre-treatment scores (M, SD): Depression	PHQ9: 13.44 (5.308)	HADSD: 4.1 (3.6)
Post treatment scores (M,SD) : Depression	PHQ9: 3.44(2.23)	HADSD 6M: 3.3 (3-1)
Effect size-Depression	**1.9**	**0.22**
Pre-treatment scores (M,SD): Anxiety	GAD7: 12.67 (4.666)	HADSA: 6.7 (4.2)
Post treatment scores (M, SD): Anxiety	GAD7: 3.22 (2.55)	HADSA 6Months : 5.8 (3.8)
Effect size -Anxiety	**2.0**	**0.21**
Pre-treatment scores (M,SD): Quality of life (higher score higher Quality of life)	SIBDQ: 36.22 (9.01)	NR
Post treatment scores(M,SD) : Quality of life	SIBDQ: 55.04 (6.39)	NR
Effect size-quality of life	**-2.09**	**NR**
Pre- treatment scores :(M,SD) Disease Activity CD UC	 HBI: 7.0 (3.95) SCCAI: 4.93 (2.46)	 CDAI : 101.2 (65.5) SCCAI:3.2 (1.5)
Post treatment scores :(M, SD) DA activity: CD UC	 HBI: 4.25(3.19) SCCAI: 2.27(1.79)	 CDAI 6Months : 97.3 93.7) SCCAI 6Months : 3 (1.9)
Effect size-disease activity: CD UC	 **0.71** **1.1**	 **0.06** **0.13**

This study's findings may have been influenced by our choice of measures. We used the GAD7 (Spitzer et al, 2006) to measure symptoms of anxiety and the PHQ9 (Spitzer et al, 1999) for symptoms of low mood and it is possible that these measures are more sensitive to change in the IBD population than the HADS which was used in the comparison trial (Mikocka- Walus et al, 2015). There is some controversy surrounding the HADS with some studies showing it to be equally good at detecting anxiety and low mood as the GAD7 & PHQ9. However recent psychometric systematic reviews have found it to be a measure of general distress rather than distinct mood states (Norton et al, 2013, Costco et al, 2012). As yet it is unclear which questionnaires are best suited to measuring anxiety and low mood in IBD. Further work on the validity of measures for this population would be useful.

In the CBT clinic patients were offered transdiagnostic CBT based on individual case formulations meaning that treatment strategies targeted the specific psychological processes underpinning the symptoms and situations the patient described as problematic (Barlow et al, 2011). This contrasts with the CBT provided in the RCT which followed a protocol and was delivered online. As many people with IBD present with multiple co-morbidities a transdiagnostic approach may be more suitable. A recent preliminary evaluation of the impact of a one day transdiagnostic CBT group intervention on distress in IBD found anxiety scores were significantly reduced at 3 month follow up (Hou et al, 2017). In addition the therapy within the clinic was delivered by a psychological therapist which may be more acceptable and engaging for the majority of patients. Drop outs reported for the CBT service (n=1, 3.5%) were small whilst attrition at 6 months from the CCBT group in the comparison trial was high at

48%. This is also likely to have reduced any treatment effects (Mikocka- Walus et al, 2015).

Previous benchmark studies have suggested that the experience of the therapist as well as waiting times may influence participation and outcomes (Scheeres et al, 2008). In this study the therapist had 15 years of experience and this was a newly established psychological service. To the authors knowledge it is the first to be located geographically within an IBD clinical service in the UK. This may serve to lessen any perceived stigma in regards to seeking or receiving treatment for a mental health problem as it does not involve attending a psychiatric outpatient setting. This new service was received enthusiastically by both clinicians and patients. Further, there was no waiting time to commence treatment. It is likely that all these factors positively affected engagement in therapy.

Limitations and future directions

The pragmatic design of this study and the absence of a control group means that the benefits of a clinic based CBT intervention for mood and quality of life must be interpreted with some caution. As no comparison data can be provided we cannot say with any certainty whether these promising results are truly due to the intervention, or for example repeated testing, spontaneous recovery or changes in treatment conditions. It has been suggested that in recent onset cases of depression spontaneous remittance is common and the benefits of psychological intervention may be modest (Clark et al 2008). In addition the statistical principle of regression to the mean predicts that elevated scores are likely to decline over time even without intervention. To

control for the effects of confounding variables future studies would benefit from randomisation and a control condition. This may prove difficult in a clinical setting but a waiting list control group may be feasible next step. Equally important is the inclusion of participants with clinically significant emotional distress in future RCTs.

Measurements of anxiety, low mood, quality of life and disease activity in our study were all based on self- report measures. We therefore cannot say with any certainty whether improvements in disease activity were due to a reduction in inflammation or changes to the appraisal of symptoms. Ideally prospective studies would include objective measurements such as endoscopy and faecal calprotectin analysis and structured clinical interview (Jordan et al, 2016). Future studies should also consider assessing objectively any changes to medication or treatment regimens as potentially confounding variables.

Further, this pragmatic study of CBT implementation embedded within an outpatient gastroenterology service did not follow a specific treatment manual and no treatment integrity checks were carried out. It is therefore possible that the intervention may have deviated from a CBT paradigm. Patients also received a variable number of sessions in comparison to the RCT and this may have further confounded results. In addition the number of participants undertaking CBT was small (n=27). In order to enhance generalisability further studies should consider a larger sample.

Finally, three of the 27 people entered in CBT were taking antidepressants. However, only one had commenced them in the last month. The two other

participants had been receiving pharmacological treatment for more than 8 months prior to commencing CBT. This reduces the likelihood that change could be attributed to the pharmacological intervention.

The CBT clinic fulfilled the majority of the criteria for clinical representative as set out by Shadish et al, (2000) in that it (a) took clients who had clinically representative problems, (b) took place in a clinical setting, (c) saw clients who were referred through normal clinical routes from IBD nurse Specialists and gastroenterologists, (d) used a psychological therapist who had CBT training and held a caseload of IBD patients, (e) followed a typical structure for the clinical practice, (f) treatment was not monitored closely to impact the psychological therapists behaviour, (g) the population had heterogeneous problems and were clinically representative, (h) the psychological therapist did not receive specific training immediately prior to the clinic, (i) the psychological therapist could use a variety of techniques and (j) there was not a limited number of sessions. This is important as it adds further evidence for a clinic based CBT intervention being able to match and in this case better effect sizes of RCTs.

6.6: Conclusion

In summary, the results of this study suggest that CBT for people with IBD and symptoms of anxiety and low mood is beneficial when implemented in clinical practice for the majority of participants and that large effect sizes can be observed. Clinically significant levels of anxiety and low mood should be considered as inclusion criteria for the selection of participants in future RCTS and the addition of a control group should be considered for future clinic based intervention studies. Finding an effective psychological intervention for people with IBD is of vital importance given the impact that these mood disorders have been observed to have on disease parameters.

Given the established association between anxiety, low mood and disease activity and the potential impact that CBT may have on improving these outcomes, clinicians working with people with IBD in gastroenterology clinics should be trained to recognise symptoms of mood disorders and to refer to psychologically trained therapists. As there is some debate as to the cost-effectiveness of widespread screening of mental health in primary care (Thombs et al, 2014) and higher-risk populations (Goldberg, 2014) this may be a more effective means of facilitating referrals to psychological services for further evaluation and treatment where indicated.

Chapter 7: Overall Discussion

The main aim of this thesis was to investigate the psychological processes associated with negative adjustment outcomes for people with IBD, in order to identify evidence based targets which could be addressed in a psychological intervention. The purpose of this final chapter is to synthesise the findings from all 4 studies included in this thesis and consider the overall evidence for 1) psychological factors and their associations with negative adjustment outcomes for adults with IBD 2) the potential benefits of a novel psychological intervention for improving outcomes in this population and 3) the implications for healthcare and further research.

The first study in this thesis systematically reviewed the existing literature which addressed psychological factors which were associated with, predictive or explanatory of adjustment outcomes in adults with IBD. The aim was to: a) Identify the types of psychological factors that have been studied to date and their associations with adjustment outcomes in adults with IBD; b) Establish which psychological variables served to explain or predict differences in how well people adjusted to living with IBD; c) Gain an overview of the strength of evidence for relationships between psychological variables and adjustment outcomes in IBD; d) Identify common methodological weaknesses in the research, gaps within the literature, and directions for future research.

Emotion focused coping strategies, perceived stress, IBD related cognitions (such as illness perceptions), emotions and emotional control (such as hostility, aggression and alexithymia), interpersonal traits (such as anxious attachment style) and personality traits (such as neuroticism and perfectionism) were all

found to link to negative adjustment outcomes after controlling for the influence of sociodemographic and disease related factors. These findings are illustrated in orange in figures 7.1 & 7.2 below. Personality traits, interpersonal traits and emotions and emotional control are depicted in this model as predisposing factors due to their relatively stable nature over time and likely influence on the way an individual responds to their diagnosis of IBD. All other variables are conceptualised as perpetuating factors due to their hypothesised role in maintaining or exacerbating problems with mood (Jordan et al, 2016).

This reviews conclusions were based on the findings of a limited number of studies exploring a diverse range of psychological variables with only one study providing any longitudinal data (Jordan et al 2016).The review suggested that qualitative studies provided a more detailed account of the challenges of living with IBD from the patients perspective and could provide some direction for psychological factors to be considered in future quantitative studies. However it was acknowledged that qualitative studies currently offered no insight into how the challenges of living with IBD linked to anxiety or low mood (Kemp et al 2012). A cognitive behavioural model was proposed for understanding the psychological processes associated with negative adjustment in IBD. This framework was applied in the subsequent empirical studies of this thesis to structure investigations of the cognitive, emotional and behavioural responses linked to anxiety, low mood, psychological distress and poor quality of life for adults with IBD. This model had not be utilised in any previous studies (Jordan et al. 2016).

Following the methodological weaknesses identified in this area of research by the literature review, a mixed method research approach was adopted in the subsequent studies contained within this thesis. A qualitative approach with in depth semi structured interviews was employed to explore 1) the specific situations, thoughts, perceptions, appraisals, beliefs and behaviour that people with IBD described as linked to their symptoms of anxiety and low mood 2) the type of psychological help or support people with IBD and elevated symptoms of anxiety and low mood would like as part of routine medical care. A secondary aim was to consider these findings in relation to the knowledge associated with the competencies set for psychological therapists delivering interventions for long term conditions (Jordan et al, 2017).

The qualitative analysis of participant accounts identified that concerns pertaining to underperformance at work and preventing an accident in public were linked to symptoms of anxiety. Low mood was associated with a perceived lack of understanding of IBD from others and stigma. In each of these domains distinct cognitive and behavioural responses were described by participants. Participants reported an all or nothing behavioural response to concerns about the consequences of reduced occupational functioning which included increasing their workload in order to compensate in advance for future periods of sickness. In response to anxiety about preventing the occurrence of an accident in public, participants described a range of avoidant and safety seeking behavioural responses such as changing modes of travel, carrying spare clothes and adjusting eating habits. Importantly the results from this study suggested that it was the perception or recognition that a toilet was inaccessible that triggered feelings of anxiety, rather than symptoms or

sensations originating from the bowels. In response to thinking that others misunderstood their illness participants described feeling low in mood and cancelling social plans. This findings are illustrated in green in figure 7.1 and 7.2.

Overall this analysis highlighted the situations, cognitions and behaviours linked to symptoms of anxiety and low mood by people with IBD and some potentially unhelpful interactions between these factors were hypothesised. Anxiety related responses appeared catastrophic and lacked acceptance whilst responses related to low mood were more characterised by hopelessness and withdrawal. These cognitive and behavioural responses were potentially modifiable factors which it would have been possible to address in a psychological intervention and the vast majority of participants in this study stated a desire for psychological support. Significantly, the findings suggested a strong preference for this to be delivered by a compassionate practitioner who could draw on specialised knowledge of the key symptoms of IBD and their impact on functioning and mental health, with a focus on building coping strategies. Finally, the findings of this study suggested that psychological therapists working with this group would require advanced skills in conducting bio-psychosocial assessments in order to gain a clear picture of the differing psychological processes impacting on mood and levels of anxiety (Roth & Pilling 2015).

Utilising a qualitative approach in this study meant that people with IBD and disturbance to mood had the opportunity to articulate their personal experience of IBD stressors and their responses to them, rather than

conforming to predefined categories and terms imposed on them by quantitative measures (Sofaer, 1999). Although qualitative research findings are argued to lack generalisability due to their subjective nature and often small samples, these limitations were addressed through the use of quantitative methods in subsequent studies.

A quantitative approach was therefore adopted to further investigate the cognitive, emotional and behavioural responses associated with negative adjustment outcomes; anxiety, Low mood, general psychological distress and poor quality of life. Data on sociodemographic, clinical, and psychological factors and adjustment outcomes were collected via self-report measures at baseline and 3 month follow up. A cross sectional and prospective analysis was carried out in order to assess the relationships between psychological factors assessed at baseline and adjustment outcomes at baseline and 3 month follow up.

It was hypothesised that unhelpful beliefs about experiencing and expressing negative emotions (BeS), unhelpful behavioural responses to gastrointestinal symptoms (IBS-BRQ), a lack of acceptance beliefs towards symptoms (CPAQ), avoiding exercise due to a fear it will make symptoms worse (CBSQ: FA), believing symptoms are damaging (CBSQ:D), focusing on symptoms (CBSQ: SF), excessive resting to manage symptoms (CBSQ: AR), all or nothing behaviour (CBSQ: AL) and avoidance of activities due to embarrassment about symptoms and worries about how others will judge symptoms (CBSQ: EA), would be associated with baseline (Time 1) cases of anxiety, depression, psychological distress and poor health related quality of life, when taking sociodemographic,

disease related and clinical variables into account. Further, it was anticipated that these cognitive, behavioural and emotional responses would be associated with an increased risk of being a moderate case of anxiety, depression, psychological distress and poor health related quality of life at three month follow up in the prospective analysis. (Time 2).

The results of the cross sectional and prospective analysis identified some variation and overlap in the range of cognitive, emotional and behavioural responses associated with and predictive of each negative adjustment outcome for each IBD type. The psychological factors associated with negative adjustment outcomes for the UC group and CD group are illustrated separately in figure 7.1 and 7.2 below. Cross sectional associations from this study are depicted in purple and are conceptualised as perpetuating factors due to their likely role in maintaining or exacerbating disturbance to mood and quality of life. Prospective associations are represented in black as risk factors for each outcome due to the longitudinal nature of the data.

Overall the most important risk factors for negative adjustment outcomes for the UC group were initial disturbances to mood and quality of life. The most consistent psychological factors identified as perpetuating factors for this group were unhelpful beliefs about emotion, a lack of acceptance beliefs, symptom focusing and resting behaviour. For the CD group , baseline disturbance to mood, quality of life and avoidant, safety seeking and all or nothing behavioural responses were consistent risk factors for negative adjustment outcomes, whilst unhelpful cognitive responses such as unhelpful beliefs about emotions, a lack of acceptance beliefs, symptom focusing, as well

as avoidant and safety seeking behavioural responses to manage gastrointestinal symptoms were frequently identified in the cross sectional analysis as potentially perpetuating factors.

Due to a much larger sample size and the ability to take confounding variables into account in the analyses, the results from these types of studies are generally considered to be more precise, reliable and generalisable to the wider population. In addition, the results of the prospective analysis offered the strongest evidence to date for the direction of the relationship between psychological factors and negative adjustment outcomes. The use of both quantitative and qualitative evidence has been specifically recommended for the process of developing and evaluating complex interventions such as psychological interventions (Campbell et al., 2000; Campbell et al., 2007).

In combination with the findings of the qualitative study, the overall results of this thesis suggest that behavioural responses to managing symptoms are particularly significant in the development and maintenance of anxiety, low mood, distress and poor quality of life, especially for adults with CD.

The final study of this thesis investigated the clinical benefits of a non-randomised uncontrolled trial of clinic based cognitive behaviour therapy (CBT) for adults with IBD who had moderate to severe levels of anxiety and low mood and compared the results to a previous randomised controlled trial of CBT in this population. Previous randomised controlled trials had found no evidence that psychological interventions enhanced outcomes for people with IBD but had recruited patients without distress (Timmer et al, 2011).

It was hypothesised that levels of anxiety and low mood would reduce after the clinic based CBT intervention and that uncontrolled effect sizes would be superior to the effect sizes in the comparison RCT. The results of this study identified statistically significant improvements to mood, quality of life and symptomatic disease activity and uncontrolled effect sizes were superior to those of the RCT. This suggested that CBT may have benefits for those with moderate to severe disturbances to mood and that the effect sizes of RCT's could be improved by targeting those with distress. Figure 7.3 below illustrates a logic model for the development of psychological interventions for improving adjustment outcomes in this population and outlines key interventions and behavioural change techniques to target unhelpful cognitive, emotional and behaviour responses linked to these outcomes by the studies of this thesis.

Figure 7.1: Psychological factors linked to adjustment for people with Ulcerative colitis.

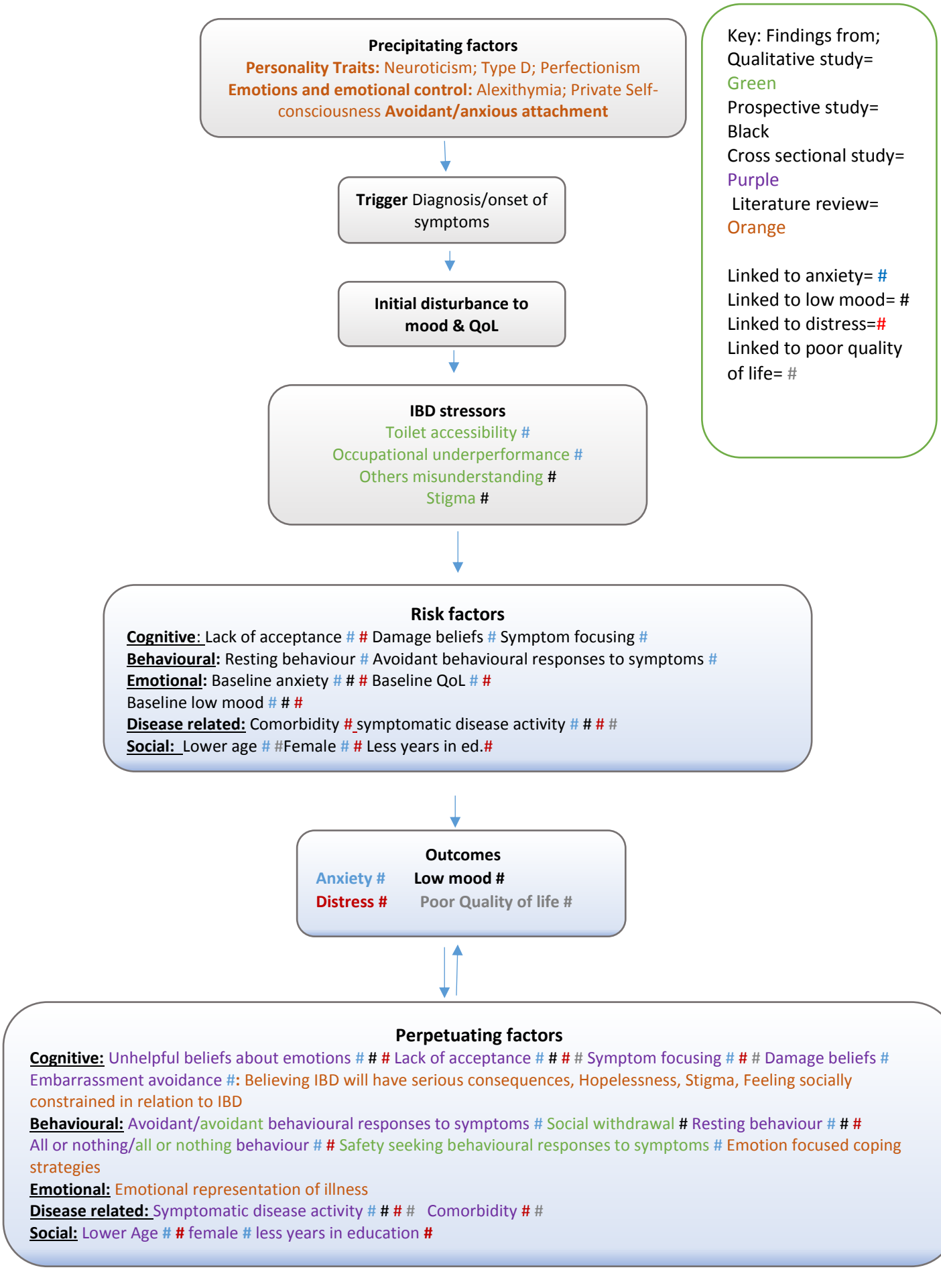


Figure 7.2: Psychological factors linked to adjustment for people with Crohn's disease.

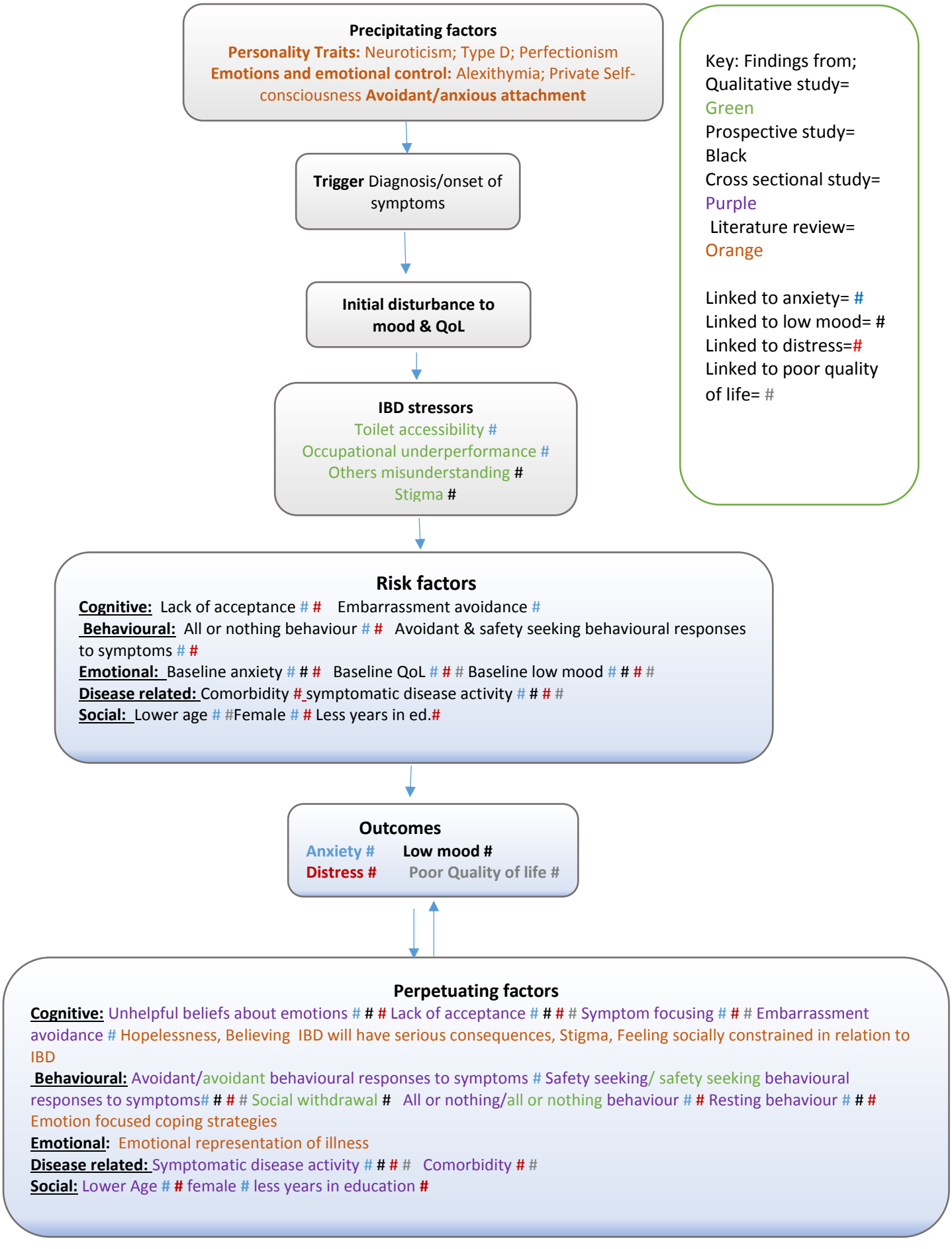
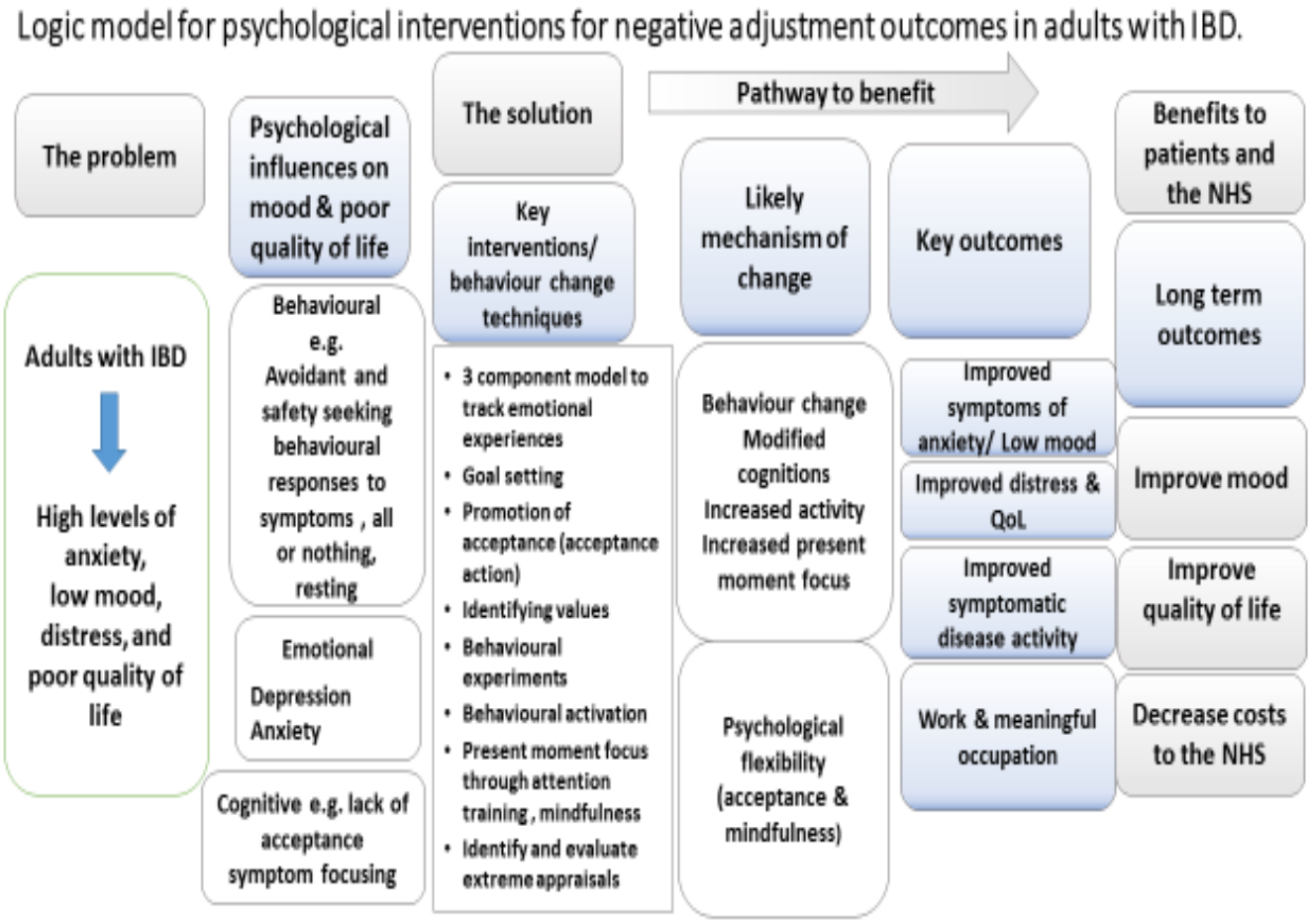


Figure 7.3: Logic model for psychological interventions for negative adjustment outcomes in adults with IBD



Methodological limitations and future directions

The overall studies contained within this thesis have some potential limitations. The systematic review, as a starting point of this thesis, aimed to identify and critique existing empirical studies of modifiable psychological variables and their links to adjustment outcomes. Given that this growing body of empirical literature had not been previously reviewed a broad and multifaceted research question was adopted. This resulted in a heterogeneous

selection of studies being included which precluded meta-analysis. Furthermore much of the primary research reviewed used small samples, cross-sectional designs and explored a narrow range of psychological variables. This made the reviews conclusions tentative. Hopefully in future there will be enough research to conduct a more focused review on the role of cognitive, emotional and behavioural variables in determining adjustment outcomes in adults with IBD and a meta- analysis can be carried out.

The qualitative study utilised a relatively small sample and the participants had all taken part in an online survey measuring illness perceptions, anxiety, depression, quality of life and functioning. It is arguable therefore that the deductions based on the results of this study relate to a specific cohort of adults with IBD which may not be generalizable to the wider population, although this is unlikely as some of this study's findings were replicated in the cross sectional and prospective analysis (e.g. all or nothing and avoidant and safety seeking behavioural responses to gastrointestinal symptoms).

Selection bias can be a problem in cross sectional and prospective studies but this is unlikely to have been the case in this thesis as participants were not selected in relation to the exposure or outcomes of interest. The cross sectional and prospective study of this thesis employed a convenience sample recruited from a gastroenterology outpatient clinic and IBD patient organisation. An advantage of this type of sampling is that is less open to selection bias because the participants are likely to be less selected than in randomised controlled trials (Bowling, A 2009).

Cohort studies can be subject to attrition bias due to differences between patients who did and did not complete the follow-up period. However, the response, rate for the cohort study in this thesis was > 75% and baseline socio-demographic and clinical variables were similar between the two groups (e.g. those who completed baseline measures only and those who completed measures at baseline and 3 month follow up). There was also no statistically significant differences between these groups on the majority of baseline measures of psychological variables (Song et al, 2010).

Logistic regression was the method of analysis used in the cross sectional and prospective study. This was effective for demonstrating the size of effect. However due to the binary outcome some information contained in the continuous outcomes may have been lost. Further, a cut off score of 11 or more on the HADSA and HADSD was utilised to indicate moderate cases of anxiety and depression in the analysis, the results may have varied if a score of 7 or more had been employed to delineate mild cases. This may also have been the case if different cut off scores had been used for distress and poor quality of life.

Due to concerns about collinearity psychological factors were not entered collectively into a multivariable model for each outcome across time points. It was therefore not possible to assess which predictor variables were most important for negative adjustment outcomes or which predictors were redundant in the presence of others. Each psychological factor was entered into its own model for each outcome which was adjusted for relevant sociodemographic and disease related factors. It was therefore possible to

identify the psychological factors which remained significant when taking those factors into consideration (Bland, M, 2009).

A further methodological consideration pertains to the relatively short time-line between baseline and follow up in the prospective study which may have left little time for change and processes that are truly explanatory to become clear. Overall cognitive, emotional and behavioural responses to symptoms were important precipitating and perpetuating factors for the majority of negative adjustment outcomes which suggests these factors are a useful focus for future research. With the exception of the fear avoidance subscale of the cognitive behavioural response to symptoms scale (Skerrett et al, 2006), all other measures of psychological variables showed an association with either baseline or follow up cases of anxiety, low mood, distress or poor quality of life. These measures therefore seem particularly useful to pursue in in future prospective studies which should be carried out over an extended follow up period. As cognitive and behavioural responses to symptoms were not identified as risk factors for depression in the prospective study additional measures of hopelessness, self-esteem, perceptions of stigma and social relationships as well as dysfunctional assumptions that relate to the self should be considered for inclusion in future cross sectional and prospective studies. Further analysis might also focus on the numbers of people who were cases of depression and anxiety at each time point to assess the true incidence of cases at time 2.

The pragmatic design of the nonrandomised uncontrolled trial of clinic based CBT meant that there was no control group. Consequently there was no

comparison data provided and it could not be stated with any certainty whether the promising results were truly due to the intervention, or for example spontaneous recovery, therapist attention or regression to the mean (Clark et al, 2008). To establish efficacy future studies would need to employ a randomised controlled design with either an active comparison and/or a control condition. As both CBT and ACT may have benefits for improving mood and quality of life for people with IBD, these two psychological interventions could be compared in an RCT. Given the results of the non-randomised uncontrolled trial of clinic based CBT reported in this thesis it is essential that any such study recruit participants with IBD and significant levels of disturbance to mood. As potential participants could be randomised to one of two active conditions this would circumvent any ethical issues relating to withholding an intervention with likely efficacy from distressed individuals, if such a study were to be conducted in a clinical setting. RCT's are however expensive, retention can be problematic and there are concerns that results don't translate into clinical practice due to for example higher inclusion criteria (Quarmby et al, 2007).

Clinic based CBT and ACT interventions could be evaluated using a non-randomised uncontrolled trial design. Uncontrolled effect sizes could be calculated for each intervention and compared and potentially benchmarked against RCTs. This would provide some comparison data and an indication of the real world impact of these intervention for people with IBD and distress but would supply limited evidence for efficacy. A within participants design maybe of utility as participants could take part in both psychological interventions, this could be conducted under RCT or uncontrolled conditions.

In this type of design participants act as their own control and this reduces the amount of error which can arise from natural variance between individuals. An advantage of this type of design is that it requires fewer participants. A disadvantage concerns cross over effects whereby the first intervention influences the second. This could potentially be addressed by counterbalancing whereby the sequence of the interventions is varied (Charness et al, 2012).

Irrespective of the type of design selected for further evaluation of psychological interventions for people with IBD and significant distress, psychological factors which mediate change in the adjustment process should be evaluated. This would provide a further test of the relationships between cognitive, emotional and behavioural responses and adjustment outcomes, helping to identify which factors are most important for alleviating problems with mood. A qualitative element could be also included to explore participants' experience of the intervention. For a within participant design this could include an evaluation of the type of intervention that was preferred by participants. As initial disturbance to mood was identified in this thesis as a significant risk factor for the development of subsequent psychopathology low intensity CBT and ACT intervention should also be evaluated for their benefits for improving mood.

Finally, measurements of anxiety, low mood, quality of life and disease activity in all of the studies reported in this thesis were based on self- report measures. Objective measurements of mood through structured clinical interview and disease activity via endoscopy and faecal calprotectin analysis would give a more robust indication of these outcomes and any changes to them as a result

of psychological intervention (Jordan 2016). Future studies would also benefits from assessing objectively any changes to medication or treatment regimens as potentially confounding variables.

Clinical implications for treatment

The overall results of this thesis have shown anxiety, depression, general psychological distress and poor quality of life to be associated with a range of unhelpful cognitive, emotional and behavioural responses which showed some similarity and variation by IBD type. A particularly important finding from this thesis concerns the role of initial disturbance to mood and its influence on the subsequent development of psychopathology. The findings of the prospective analysis suggest that if left untreated early symptoms of anxiety and depression may progress into clinically significant disturbances to mood for both UC and CD. Early detection of disruption to mood by clinicians working with people with IBD may therefore be beneficial to facilitate timely referrals to psychological services to prevent an escalation in psychological symptoms. A stepped care model would be well suited to organising the provision of psychological services for people with IBD. The initial step for subthreshold symptoms of mild to moderate disturbance to mood could include low intensity psychological interventions such as working through a self-help manual with minimal professional support. Moderate to severe anxiety and low mood would be offered high intensity interventions based on a cognitive behavioural approach (Nice, 2018).

The Cognitive, emotional and behavioural responses associated with negative

adjustment outcomes in this study showed some overlap across IBD types. For example, a lack of acceptance beliefs, avoidant and safety seeking behavioural responses to gastrointestinal symptoms, social withdrawal and symptoms focusing were all significantly linked to most outcomes for both groups. There was however also evidence of specificity e.g. all or nothing behaviour was an important risk factor for negative adjustment outcomes for the CD group only. A flexible approach to treating symptoms of anxiety and low mood may therefore be of benefit. The nonrandomised uncontrolled trial of a clinic based CBT intervention reported in this thesis adopted a transdiagnostic CBT approach to target the shared cognitive and behavioural processes underlying the development and maintenance of emotional distress (Clarke et al, 2009). It did not require the therapist to determine a primary diagnosis i.e. depression or an anxiety disorder, as is the case with disorder specific CBT. As a consequence it was arguably a more efficient way to work with patients who were presenting with multiple clinical problems (Mansell et al, 2008).

An additional complexity in working with emotional distress in this population concerns the role of disease related factors. A flare up in disease activity or extra intestinal complications such as anaemia might have initially necessitated some of these responses such as resting, staying home or always knowing the whereabouts of toilets but once symptoms begin to subside this may be less useful. The findings of the qualitative study identified that feelings of anxiety were often triggered by the appraisal that a toilet was inaccessible rather than sensations arising from the bowel and this may prove to be a useful distinction for recognising if behavioural responses are emotion driven or necessitated by disease activity. A similar distinction may also be apparent in triggers for

resting behaviour. For example, in some cases it may be driven by physical fatigue relating to disease factors and in others by extreme or unhelpful cognitions. Psychological therapists working with this population may need to be particularly sensitive to the motivators for a particular behaviour before attempting to address it in a psychological intervention to improve mood.

The CBT clinic which provided the setting for the non-randomised uncontrolled trial reported in this thesis was located within an IBD clinical service. This was advantageous for the psychological therapist as it provided frequent opportunities to liaise directly with the clinical IBD team. Psychological services provided off site via improving access to psychological service provision will not have the benefit of such close proximity to the patients' clinical team and the opportunity for collaborative working may be compromised as a consequence. Further, locating psychological services within an IBD clinical service may serve to lessen any perceived stigma in regards to seeking or receiving treatment for a mental health problem as it does not involve attending a psychiatric outpatient setting.

Conclusion

This thesis has presented a series of studies which have investigated and pinpointed the situations and unhelpful cognitive, emotional and behavioural responses associated with and predictive of anxiety, low mood, psychological distress and poor quality of life. Further good quality longitudinal studies are required to further test and replicate these important findings.

In addition, the benefits of a transdiagnostic clinic based CBT approach was considered for modifying these cognitive, emotional and behavioural responses to improve outcomes in this population. This series of studies has provided insights into how psychological interventions should be designed and delivered to be helpful and acceptable for people with IBD and disturbance to mood and quality of life. Given the established impact that anxiety and depression can have on the course of IBD (Mikocka et al, 2016), further tests of the efficacy of psychological intervention for this population are now timely.

References

Acock A.C, (2016). A gentle introduction to Stata. A Stata press publication. USA.

Addolorato, G., Capristo, E., Stefanini, G.F., Gasbarrini, G., (1997). Inflammatory bowel disease: a study of the association between anxiety and depression, physical morbidity, and nutritional status. Scandinavian Journal of Gastroenterology, 32 (10), pp. 1013–1021.

Amir N., Foa E. B., Coles M. E. (1998). Negative interpretation bias in social phobia. Behaviour Research Therapy, 36, pp 945-957.

Beck A,. (1976). Cognitive therapy and the emotional disorders. Meridian. New York.

Beck A.,B. (2005). The Current State of Cognitive Therapy, A 40-Year Retrospective. GEN PSYCHIATRY. VOL 62, SEP.

Bowling A., (2009). Research Methods in Health. Open University press. England.

Boye, B. K. E. A., Lundin, S., Leganger, K., Mokleby, G., Jantschek, I., Jantschek, S., Kunzendorf, D., Benninghoven, M., Sharpe, I. Wilhelmsen, S., Blomhoff, U. F., Jahnsen, M.J., (2008). The INSPIRE study: Do personality traits predict general quality of life (short form-36) in distressed patients with ulcerative colitis and Crohn's disease? Scandinavian Journal of Gastroenterology 43(12), pp. 1505-1513.

Breitholz E., Westling B., Oest L. G,. (1998). Cognitions in generalized anxiety disorder and panic disorder patients. Journal of Anxiety Disorders, 12, pp 567-577.

Burger JL. (2005) living with inflammatory bowel disease: bodily and social responses to illness. St. 7-B. Louis, MO: Saint Louis University; 2005.

Bursac .Z, Gauss H., Williams D.K, Hosmer D.W. (2008).Purposeful selection of variables in logistic regression. Source Code Biol Med. 3 (17).

Cámara RJ., Ziegler R., Begré S., Schoepfer AM., Von Kanel R.; Swiss Inflammatory Bowel Disease Cohort Study (SIBDCS) group, (2009). The role of psychological stress in inflammatory bowel disease: quality assessment of methods of 18 prospective studies and suggestions for future research. Digestion. 80(2):129-39

Caplan, R.A., Maunder, R.G., Stempak, J.M., Silverberg, M.S., Hart, T.L. (2014). Attachment, Childhood Abuse, and IBD-related Quality of Life and Disease Activity Outcomes. Inflammatory Bowel Disease. 20(5), pp. 909-915.

Centre for reviews and dissemination, (2009). CRD's guidance for undertaking reviews in health care. University of York.

Clark D., M. (1999). Anxiety disorders: why they persist and how to treat them Behaviour Research and Therapy 37, pp 5-27.

Cramer K., G., Langlois M. (2005). Self-silencing and depression in women and men: comparative structural equation models. Personality and Individual Differences, 39, pp 581-592.

Crane, C., Martin, M. (2004). Social learning, affective state and passive coping in irritable bowel syndrome and inflammatory bowel disease. General Hospital Psychiatry 26(1), pp. 50-58.

Creswell JW., Miller DL., (2000). Determining validity in qualitative inquiry. Theory Pract.39:124–130.

Davis, M. L., Morina, N., Powers, M. B., Smits, J. A. J., Emmelkamp, P. M. G. (2015). A Meta-Analysis of the Efficacy of Acceptance and Commitment Therapy for Clinically Relevant Mental and Physical Health Problems. Psychotherapy and Psychosomatics 84 (1), pp. 30-36.

Davis R.,N, Nolen-Hoeksema S. (2000). Cognitive Inflexibility Among Ruminators and Nonruminators Cognitive Therapy and Research, 24 (6), pp. 699–711

Deary V., Chalder T., Sharpe M. (2007). The cognitive behavioural model of medically unexplained symptoms: A theoretical and empirical review. Clinical Psychology Review 27 pp781–797

Dennison L., Moss-Morris R., Silber E., Galea I., Chalder T. (2010). Cognitive and behavioural correlates of different domains of psychological adjustment in early-stage multiple sclerosis. J Psychosom Res. Oct; 69(4), pp353-61.

Dennison L., Moss-Morris, R., Chalder, T.(2009).A review of the psychological correlates of adjustment in patients with multiple sclerosis .Clinical Psychology Review 29, pp 141-153.

Dennison l., Moss-Morris, R., Yardley L. ,Kirby S,. & Chalder, T. (2013) Change and processes of change within interventions to promote adjustment to multiple sclerosis: Learning from patient experiences, Psychology & Health, 28:9, 973-992.

De Ridder, R., Geenen R., Kuijer R., van Middendorp H. (2008) Psychological adjustment to chronic disease. Lancet. Jul 19; 372 (9634): pp246-55.

Devlin J., Beusterien K., Yen, L., Ahmed, A., Cheifetz, AS., Moss, AC. (2014). The Burden of Inflammatory Bowel Disease: A Patient-Reported Qualitative Analysis and Development of a Conceptual Model. Inflamm Bowel Dis. 2014 March; 20(3): 545–552.

Dorrian, A., Dempster M., Adair A. (2009). Adjustment to inflammatory bowel disease: The relative influence of illness perceptions and coping. Inflammatory Bowel Diseases 15(1), pp 47-55.

Dudley-Brown S. (1996). Living with ulcerative colitis. Gastroenterol Nurs. 19: 60–64.

Eysenck, H. J., Eysenck, S.B.G., (1976). Psychoticism as a Dimension of Personality. London, Hodder & Stoughton.

Faust, A. H., Halpern, L.F., Danoff-Burg, S., Cross, R.K., (2012). Psychosocial factors contributing to inflammatory bowel disease activity and health-related quality of life. Gastroenterology and Hepatology 8(3), pp 173-181.

Feros D. L, Lane L., Ciarrochi J., Blackledge J., T. (2013). Acceptance and Commitment Therapy (ACT) for improving the lives of cancer patients: a preliminary study. Psycho-Oncology, 22(2), pp 459–464.

Ferster, C., B. (1973). A Functional Analysis of Depression. American Psychologist, 28, 857-870

Filipović B R., Filipović B F., Kerkez M., Milinić N., Randelović T. (2007).Depression and anxiety levels in therapy-naive patients with inflammatory bowel disease and cancer of the colon. World J Gastroenterology. 13(3), pp 438-43.

Flett, G. L., Baricza, C., Gupta, A., Hewitt P.L., Endler, N.S., (2011).Perfectionism, psychosocial impact and coping with irritable bowel disease: A study of patients with Crohn's disease and ulcerative colitis. Journal of Health Psychology 16(4), pp 561–571.

Goodhand, J. R., Wahed, M., Mawdsley, J.E., Farmer, A.D., Aziz, Q., Rampton, D.S., (2012). Mood disorders in inflammatory bowel disease: relation to diagnosis, disease activity, perceived stress, and other factors. Inflammatory Bowel Diseases 18(12), pp 2301-2309.

Graff, L. A., Walker, J., Lix, R., Clara, L., Rawsthorne, I., Rogala, P., Miller, L., Jakul, N., McPhail, L., Ediger, C., Bernstein, J. (2006). The Relationship of Inflammatory Bowel Disease Type and Activity to Psychological Functioning and Quality of Life. Clinical Gastroenterology and Hepatology 4 (12), pp1491-1501.

Graham C.D., Gouick J., Krahé C., Gillanders D. (2016). A systematic review of the use of Acceptance and Commitment Therapy (ACT) in chronic disease and long-term conditions. Clinical Psychology Review 46. pp 46–58

Green, B.F., Hall, J. A. (1984)." Quantitative methods for literature reviews. Annual review of psychology, 35, pp 37-53.

Gregg J. A., Callaghan G.M., Hayes SC., Glenn-Lawson J. L, (2007). Improving diabetes self-management through acceptance, mindfulness, and values: A randomized controlled trial. Journal of Consulting and Clinical Psychology, 75(2), pp 336–343

Guthrie E., Jackson J., Shaffer J., Thompson D., Tomenson B., Creed F. (2002). Psychological disorder and severity of inflammatory bowel disease predict health-related quality of life in ulcerative colitis and Crohn's disease. Am J Gastroenterol. 2002 Aug; 97(8), pp 1994-9.

Haaga D.A., Dyck M.J., Ernst D. (1991). Empirical status of cognitive theory of depression. Psychol Bull. 110. pp215-236

Habshah M., Rana S. (2013) Collinearity diagnostics of binary logistic regression model, Journal of Interdisciplinary Mathematics, 13, (3), pp 253-267,

Hall NJ., Rubin GP., Dougall A., Hungin AP., Neely J. (2005). The fight for 'health-related normality': a qualitative study of the experiences of individuals living with established inflammatory bowel disease (ibd). J Health Psychol 2005; 10:443-455

Hayes, S. C., Luoma, J. B., Bond, F., Masuda, A., Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes). Psychology Faculty Publications. Paper 101.

Hayes, S.C., Levin M., Plumb-Vicarage J., Villatte J.L, Pistorello J. (2013). Acceptance and Commitment Therapy and Contextual Behavioral Science: Examining the Progress of a Distinctive Model of Behavioral and Cognitive Therapy Behav Ther. June; 44(2): pp180–198.

Harvey RF., Bradshaw JM. (1980). A simple index of Crohn's-disease activity. Lancet 1: 514.

Higgins PDR., Schwartz M., Mapili J., Krokos I., Leung J., Zimmermann E M. (2005). Patient defined dichotomous end points for remission and clinical improvement in ulcerative colitis. Gut. 54:782-788.

Holman E.A, Silver R.C (1998). Getting "stuck" in the past: temporal orientation and coping with trauma. J Pers Soc Psychol. 74(5): pp 1146-63.

Huamán J.W, Casellas F, Borruel N, Peláez A, Torrejón A, Castells I, Masachs M, Varela E, Guarner F.(2010). Cut-off values of the Inflammatory Bowel

Disease Questionnaire to predict a normal health related quality of life. Journal of Crohn's & Colitis. Dec; 4(6): pp 637-41.

Hulbert-Williams N.J, Storey L. (2016). Psychological flexibility correlates with patient-reported outcomes independent of clinical or sociodemographic characteristics. Supportive Care in Cancer, 24(6), pp2513-2521

Iglesias-Rey, M., Barreiro-De Acosta, M., Caamano-Isorna, F., Vazquez Rodriguez, I., Lorenzo Gonzalez, A., Bello-Paderne, X., Dominguez-Munoz, J.E. (2012). Influence of alexithymia on health-related quality of life in inflammatory bowel disease: Are there any related factors? Scandinavian Journal of Gastroenterology 47(4), pp 445-453.

Irvine E.J., Zhou Q., Thompson A.K (1996). The short inflammatory bowel disease questionnaire: a quality of life instrument for community physicians managing inflammatory bowel disease. CCRPT investigators. Canadian Crohn's Relapse Prevention Trial. American Journal of Gastroenterology, 91(8), pp 1571-1578

Jordan, C., Sin, J., Fear, N.T. & Chalder, T. (2016) A systematic review of the psychological correlates of adjustment outcomes in adults with inflammatory bowel disease. Clinical Psychology Review.

Jordan C., Ohlsen R., Hayee B., Chalder T. (2017). A qualitative study exploring the experience of people with IBD and elevated symptoms of anxiety and low mood and the type of psychological help they would like, Psychology & Health, pp 1-18.

Kemp K., Griffiths J., Lovell, K. (2012). Understanding the health and social care needs of people living with IBD: a meta-synthesis of the evidence. World J gastroenterol. 18(43), pp6240-6249.

Kiebles, J. L., Doerfler, B.,Keefer, L., (2010). Preliminary evidence supporting a framework of psychological adjustment to inflammatory bowel disease. Inflammatory Bowel Diseases 16(10), pp 1685-1695.

Kinas R.G., Fischer D.G., Lucie B.E., (1993). Coping patterns and related characteristics in patients with inflammatory bowel disease. Rehab Nurs.18, pp 12–19.

King N., Brooks JM., (2017). Template Analysis for business and management students. Sage. London.

Knapp P., Beck A.T. (2008). Cognitive therapy: foundations, conceptual models, applications and research. Rev Bras Psiquiatr. 30 (Suppl II) ppS54-64.

Knowles, S., Monshat, K., Castle, D., 2013. The Efficacy and Methodological Challenges of Psychotherapy for Adults with Inflammatory Bowel Disease: A Review. Inflammatory Bowel Diseases, 19(12) pp2704-2715.

Kovacs, Z., Seres, G., Kerekgyarto, O., Czobor, P. (2010). Psychopathological Symptom Dimensions in Patients with Gastrointestinal Disorders. Journal of Clinical Psychology in Medical Settings. 17(4), pp 378-386.

Lazurus, R.S., Folkman, S. (1984).Stress, appraisal and coping. New York. Springer.

Leventhal H, Meyer D, Nerenz D.R, Rachman S (1980) The common sense representation of illness danger Contributions to Medical Psychology , 2, New York Pergamon Press. pp17-30.

Liu, S., Ren, J., 1 Hong, Z., Li, X., Yao, M., Yan, D., Ren, H., Wu, X., Wang, G., Gu, G., Xia, Q., Han, G., Li, J., (2013). An Evil Backstage Manipulator: Psychological Factors Correlated with Health-Related Quality of Life in Chinese Patients with Crohn's Disease. The Scientific World Journal. Volume 2013, pp 1-9.

Mansell W, Harvey A, Watkins E, & Shafran R. (2008). Conceptual foundations of the transdiagnostic approach to CBT. Journal of Cognitive Psychotherapy: An International Quarterly.

Matcham F., Ali, S., Hotopf, M., Chalder, T. (2015).Psychological correlates of fatigue in rheumatoid arthritis: A systematic review. Clinical psychology review 39, pp 16-29.

Maunder, R.G., Lancee, W.J., Hunter, J.J., Greenberg, G.R., Steinhart, H.A., (2005). Attachment Insecurity Moderates the Relationship Between Disease Activity and Depressive Symptoms in Ulcerative Colitis. Inflamm Bowel Dis 11(10), pp 919-926.

Mawdsley, J. E., Rampton, D.S. (2005). "Psychological stress in IBD: new insights into pathogenic and therapeutic implications." Gut 54(10), pp 1481-1491.

McCracken L.M, Vowles K.E, Eccleston C. (2004). Acceptance of chronic pain: component analysis and revised assessment method. Pain 107, pp 159-166

McCracken L.M. (1998) learning to live with the pain: acceptance of pain predicts adjustment in persons with chronic pain. Pain; 74: pp 21–7.

Mikocka-Walus, A., Bampton, P., Hetzel, D., Hughes, P., Esterman, A., Andrews, J.M. (2015) Cognitive-behavioural therapy has no effect on disease activity but improves quality of life in subgroups of patients with inflammatory bowel disease: a pilot randomised controlled trial. BMC Gastroenterology. 15(54), pp 1-12.

Mikocka-Walus A,. Pittet V., Rossel JB., Von Känel R; Swiss IBD Cohort Study Group. (2016). Symptoms of Depression and Anxiety Are Independently Associated With Clinical Recurrence of Inflammatory Bowel Disease. Clin Gastroenterol Hepatol. 2016 Jun;14(6):829-835.e1

Mittermaier, C., Dejaco, C., Waldhoer, T., Oefferlauber-Ernst, A., Miehsler, W., Beier, M., Tillinger, W., Gangl, A., Moser, G. (2004). Impact of depressive mood on relapse in patients with inflammatory bowel disease: A prospective 18-month follow-up study. Psychosomatic Medicine 66(1), pp 79-84.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G. the PRISMA group. (2009). The PRISMA group. Preferred reporting items for Systematic Reviews and Meta-analysis: The PRISMA statement. British Medical Journal, 339,(2535).

Molodecky NA[1.], Soon IS., Rabi DM., Ghali WA., Ferris M., Chernoff G., Benchimol EI., Panaccione R., Ghosh S., Barkema HW., Kaplan GG.(2012). Increasing incidence and prevalence of the inflammatory bowel diseases with time, based on systematic review. Gastroenterology. 142(1) pp 46-54

Moreno-Jimenez, B., Lopez Blanco, B., Rodriguez-Munoz A., Garrosa Hernandez, E.(2007). The influence of personality factors on health-related quality of life of patients with inflammatory bowel disease. Journal of Psychosomatic Research 62(1), pp 39-46.

Moss-Morris, R. (2013). Adjusting to chronic illness: time for a unified theory. British Journal of Health Psychology, 18 (4), pp681-686.

Munson, G. W., Wallston, K. A., Dittus, R. S., Speroff T., Roumie C. L. (2009). Activation and perceived expectancies: Correlations with health outcomes among veterans with inflammatory bowel disease. Journal of General Internal Medicine 24(7), pp 809-815.

Mussell, M., U. Bocker, U., Nagel, N., Singer, M. V. (2004). Predictors of disease-related concerns and other aspects of health-related quality of life in outpatients with inflammatory bowel disease. European Journal of Gastroenterology and Hepatology 16(12), pp 1273-1280.

National Association for Colitis and Crohn's Disease (NACC), 2003. Living with IBD. NACC. Hertfordshire.

Newby JM., McKinnon A,, Kuyken W., Gilbody S., Dalgleish T. (2015). Systematic review and meta-analysis of transdiagnostic psychological treatments for anxiety and depressive disorders in adulthood. Clinical psychology review. 40. 91–110

Nordin L., Rorsman I. (2012). Cognitive behavioural therapy in multiple sclerosis: A randomized controlled pilot study of acceptance and commitment therapy. Journal of Rehabilitation Medicine, 44(1), pp 87–90.

Olbrisch, M. E., Ziegler, S. W. (1982).Psychological adjustment to inflammatory bowel disease: Informational control and private self-consciousness. Journal of Chronic Diseases 35(7), pp 573-580.

Petrak, F., J. Hardt, T., Clement, N., Borner, Egle, U. T., Hoffmann, S.O. (2001). Impaired health-related quality of life in inflammatory bowel diseases: psychosocial impact and coping styles in a national German sample. Scandinavian Journal of Gastroenterology 36(4), pp 375-382.

Reme, S.E., Darnley, S, Kennedy, T., Chalder, T. (2010). The development of the irritable bowel syndrome-behavioral responses questionnaire. Journal of Psychosomatic Research. Mar; 68 (3), pp 285-92.

Restall, G J., Simms, A M., Walker, J R., Graff, LA., Sexton, KA., Rogala L.., Miller, N., Haviva, C., Targownik LE., Bernstein CN. (2016). Understanding Work Experiences of People with Inflammatory Bowel Disease. Inflame Bowel Dis; 22: 1688–1697.

Rimes K, Chalder T, (2010). The beliefs about emotions scale (BES): validity, reliability and sensitivity to change. Journal of Psychosomatic Research, 68, pp 285-292.

Rochelle T.L, Fidler H,(2012).The importance of illness perceptions, quality of f life and psychological status in patients with ulcerative colitis and Crohn's disease. Journal of Health Psychology. 18 (7), pp972–983

Roth and Pilling (2015). A competence framework for people with persistent physical health problems: accessed at www.ucl.ac.uk/core/competenceframeworks.

Ryan EG., Vitoratou S., Goldsmith KA., Chalder T. (2018). Psychometric properties and factor structure of a shortened version of the Cognitive Behavioural Responses Questionnaire (CBRQ). Psychosom Med. 2018 Feb; 80(2):230–237.

Sainsbury, A., Heatley, R.V. (2005). Review article: psychosocial factors in the quality of life of patients with inflammatory bowel disease. Alimentary Pharmacology and Therapeutics, 21 (5), pp. 499–508.

Sajadinejad, M. S., Molavi, H,. Asgari, K., Kalantari, M., Adibi, P. (2012). Personality dimensions and type D personality in female patients with ulcerative colitis. Journal of Research in Medical Sciences 17(10), pp 898-904.

Sajadinejad, M. S., Asgari, K., Molavi, H., Kalantari, M., Adibi, P. (2012). Psychological Issues in Inflammatory Bowel Disease: An Overview," Gastroenterology Research and Practice, vol. 2012.

Salkovskis P.M,. Clark, D.M., Hackmann A., Wells A., Gelder M.G, (1999). An experimental investigation of the role of safety-seeking behaviours in the maintenance of panic disorder with agoraphobia. Behav Res Ther. Jun; 37(6), pp 559-74.

Schütze R., Rees C., Preece M., Schütze M. (2010). Low mindfulness predicts pain catastrophizing in a fear-avoidance model of chronic pain. PAIN 148. pp120–127

Seres, G., Kovacs, Z., Kovacs A., Kerekgyarto, O., Sardi, K., Demeter, P., Meszaros, E., Tury, F. (2008). Different Associations of Health Related Quality of Life with Pain, Psychological Distress and Coping Strategies in Patients with Irritable Bowel Syndrome and Inflammatory Bowel Disorder. Journal of Clinical Psychology in Medical Settings 15(4), pp 287-295.

Sewitch, M. J., Abrahamowicz, M., Bitton, A., Daly, D., Wild, G., E., Cohen, A., Katz, S., Szego, P.L., Dobkin, P. L. (2001). Psychological Distress, Social Support, and Disease Activity in Patients with Inflammatory Bowel Disease. The American journal of Gastroenterology 96(5). pp 1470-1479.

Skerrett T.N., Moss-Morris R. (2006). Fatigue and social impairment in multiple sclerosis: the role of patients' cognitive and behavioral responses to their symptoms. J Psychosom Res. Nov; 61(5):587-93.

Smolen, D., TOPP, R. (1998). Coping Methods of Patients with Inflammatory Bowel Disease and Prediction of Perceived Health, Functional Status, and Well-Being. Gastroenterology Nursing. 21(3), pp 112-118.

Song, J. W., & Chung, K. C. (2010). Observational Studies: Cohort and Case-Control Studies. Plastic and Reconstructive Surgery, 126 (6), pp 2234–2242.

Spitzer RL., Kroenke K., Williams JB. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. May 22; 166

Spitzer RL., Kroenke K., Williams JB. (1999). Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. JAMA. Nov 10; 282(18):1737–44.

StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC.

Suleman S., Rimes KA., Marsden J., Baxter T., Chalder T. (2018). CANCER-RELATED FATIGUE AND FUNCTIONAL IMPAIRMENT – TOWARDS AN UNDERSTANDING OF COGNITIVE AND BEHAVIOURAL FACTORS. (Submitted).

Swart N., Wellsted D., Lithgo K., (2013). PWE-111 Assessment and Implications of Health-Related Quality of Life in a District General Cohort of Inflammatory Bowel Disease Patients. Gut. 62: A176

Tabachnick, B.G., Fidell, L.S., (2001). Using Multivariate Statistics. 4th Edition, Allyn and Bacon, Boston.

Tabibian, A., Tabibian, J.H., Beckman, L. J., Raffals, L. L., Papadakis, K.A., Kane, S.V., (2015). Predictors of Health-Related Quality of Life and Adherence in Crohn's Disease and Ulcerative Colitis: Implications for Clinical Management. Dig Dis Sci.60, pp1366–1374.

Taft, T. H., Keefer, L., Leonhard, C., Nealon-Woods, M. (2009). Impact of perceived stigma on inflammatory bowel disease patient outcomes. Inflammatory Bowel Diseases 15(8), pp 1224-1232.

Timmer, A., Preiss, J. C., Motschall, E., Rücker G., Jantschek G., Moser G. (2011). Psychological interventions for treatment of inflammatory bowel disease (Review). The Cochrane Library (8).

Triantafillidis, J.K., Merikas, E., Aristofanis G.(2013). Psychological factors and stress in inflammatory bowel disease. Expert Review of Gastroenterology & Hepatology. 7(3), pp 225-238

Tribbick D., Salzberg M., Connell W., Macrae F., Kamm M., Bates G., Cunningham G., Austin D., Knowles, S. (2015). Differences Across Illness Perceptions in Inflammatory Bowel Disease and Their Relationships to Psychological Distress and Quality of Life. Gastroenterology Nursing. 40(4) pp 291-299

Turnbull, G. K., Vallis, T.M., (1995). Quality of life in inflammatory bowel disease: The interaction of disease activity with psychosocial function. American Journal of Gastroenterology 90(9), pp 1450-1454.

Van der Have M., Lianne M., Brakenhoff, K.P.M., Sanne J. H., Kaptein A. A., Leenders M. Veenendaal, R.A., van der Heijde D.M., van der Meulen-de Jong A.E., Hommes D.W., Fidder H.H. (2015). Back/joint Pain, Illness Perceptions and Coping are Important Predictors of Quality of Life and Work Productivity in Patients with Inflammatory Bowel Disease: a 12-month Longitudinal Study Journal of Crohn's and Colitis, pp 276–283

Verissimo, R., Mota-Cardoso, R., Taylor, G., (1998). Relationships between alexithymia, emotional control, and duality of life in patients with inflammatory bowel disease. Psychotherapy and Psychosomatics 67(2),pp 75-80.

Walker JR., Ediger JP., Graff LA., Greenfeld JM., Clara I., Lix L., Rawsthorne P., Miller N., Rogala L., McPhail CM., Bernstein CN., (2008). The Manitoba IBD cohort study: a population-based study of the prevalence of lifetime and 12-month anxiety and mood disorders. Am J Gastroenterol. Aug; 103(8)

Walmsley RS., Ayres RC., Pounder RE. (1998). A simple colitis activity index. Gut 43:29-32

Waters, E., Corcoran, D., & Anafarta, M. (2005). Attachment, Other Relationships, and the Theory that All Good Things Go Together. Human Development 48, pp 80–84.

Zigmond A.S, Snaith R.P. (1983). The Hospital Anxiety and Depression Scale. Acta Psychiatr Scand. 67: pp 361–370.

Appendix 1: A systematic review of the psychological correlates of adjustment in adults with IBD.

Search Terms

Inflammatory bowel disease or IBD or Crohn disease or CD or Ulcerative colitis or UC

AND

Adults

The search above was completed in combination with the following psychosocial factors:

Psychological adjustment

Psychological factors

Psychological distress

Emotional adjustment

Stress

Alexithymia

Depression

Anxiety

Mood

Personality traits

Perfectionism

Neuroticism

Illness perceptions

Illness cognitions

Illness related attitudes

Illness behaviour

Coping strategies

Coping behaviour

Stigmatisation

Attributions

Quality of life

etiology

social support

demographic factors

Gender

Age

Educational level

Determin$

Predict$

Correlate$

Cohort study

prospective study

observational study

Electronic databases searched:

Medline, Embase, Web of science, Cinahl and PsychINFO

Appendix 2 : A qualitative study exploring the experience of people with IBD and elevated symptoms of anxiety and low mood and the type of psychological help they would like.

Final Template.

1. **Symptoms of anxiety**
    1. Underperformance: Work
        1. Cognitive and behavioural responses
    2. Preventing an accident
        1. Cognitive and behavioural responses

1. **Symptoms of low mood**
    1. Lack of understanding
        1. Cognitive and behavioural responses
    2. Stigma
        1. Cognitive and behavioural responses

3. **Psychological support**
    1. Emotional support

Appendix 3: A qualitative study exploring the experience of people with IBD and elevated symptoms of anxiety and low mood and the type of psychological help they would like.

Headed paper

Interview Schedule: A qualitative study exploring the experience of people with IBD and elevated symptoms of anxiety and low mood and the type of psychological help they would like.

(Version 2.1/7/11)

An exploration of cognitions, emotions and coping strategies associated with inflammatory bowel disease

Participant Number:

Researcher:

Interview date:

Structured interview schedule:

How long have you had IBD? Crohn's or colitis?

How old where you when you were first diagnosed?

Can you tell me what medication you take now for your bowel problems?

Do you have any other health problems?

What treatment are you having for these?

Are you taking any other medication at the moment?

Now I would like to ask you some question about how you generally feel about having this health problem E.g. when you are not having a flare up.

What does it mean to you to have this diagnosis? What are your main concerns/problems?

How does it affect your life?

What's the worst thing about it? (main concern)

What thoughts go through your mind about that? What does it mean to you to …..?

How much do you think your treatment helps with your bowel problems?

How often do you experience symptoms of your bowel problems?

How concerned are you about having these problems?

Are there particular situations that you find difficult because of this illness?

Even when you are not having a flare up? What goes through you mind about this? What does it mean to you?

Does it affect how you feel about your future even when you are not having a flare up? If so how?

Does having this condition affect your behaviour/ what you do when you are not having a flare up?

<u>I would now like to ask you some questions about how you cope when you have symptoms.</u>

How does it affect you when experience symptoms?

What situations are most difficult?

What feelings or emotions do you have about these situations?

How does your behaviour change?

What feelings or emotions do you have when you are having a flare up?

How do you cope with this? What do you do?

Is there anything you avoid doing in case you have a flare up?

Does anyone help you? If so how?

What help would you like?

How does your partner/family respond when you are unwell?

What kind of help from healthcare services would you like?

Thank you for your time today.

Appendix 4: Participant invitation, study information and consent forms.

Headed paper

Cheryl Jordan
Lecturer
Kings College London
57 Waterloo Road
London
SE1 8WA

Email: Cheryl.jordan@kcl.ac.uk
Telephone 020 7848 3285

20/6/12 V4 PATIENT INFORMATION SHEET
Rec reference no: 12/lo/1510

https://www.surveymonkey.com/s/crohnsandcolitis1

Study Title: How stress affects people with Inflammatory Bowel Disease.

Dear ,

We would like to invite you to take part in the above mentioned research study. This study will explore how stress affects people with bowel problems.

The study is in two parts and will involve you completing a set of questionnaires online at two intervals, one now (or as soon as you have the time to spare) and then again in 12 weeks time. These questionnaires are designed to ask you about how you feel, think, cope and function with your bowel problems. The first set of questionnaires is available on the following web link:

https://www.surveymonkey.com/s/crohnsandcolitis1

-Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the study information enclosed with this letter. Please ask us if there is anything that is not clear or if you would like further information. The study is being organised by Dr Bu' Hayee, Consultant in Gastroenterology at King's College Hospital NHS Foundation Trust in conjunction with Cheryl Jordan, lecturer at King's College London. Full contact details are provided on the accompanying information leaflet.

Thank you for taking the time to read this.

Yours sincerely,

Cheryl Jordan & Dr Bu'Hayee

20/6/12 V4 PATIENT INFORMATION SHEET

Rec reference no: 12/lo/1510

Introduction

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?

Stress is sometimes associated with the experience of Inflammatory Bowel Diseases such as Crohn's Disease or Colitis. So far there has been little research investigating how various aspects of stress affect people and the way they cope. Initially this study will examine the way emotions, perceptions and behaviours affect the symptoms and quality of life for people with bowel problems.

Why have I been invited?

You have been invited because you are over 18 years old, and attend Kings College Hospital for assessment or treatment of Crohn's Disease or Ulcerative Colitis. We are asking 1000 patients to take part in this study.

Do I have to take part?

No. It is entirely up to you whether or not to take part. A decision not to take part will not affect the standard of care you receive now or in the future. If you do decide to take part you are still free to withdraw at any time by asking us to

remove your questionnaires from the study and without giving a reason. Again, this will not, in any way, affect the standard of care you receive.

What will the study involve?

This study is in two parts A & B. Part A involves you completing 11 questionnaires, which will take approximately 25 minutes and are available online at the following website address:

https://www.surveymonkey.com/s/crohnsandcolitis1

Then in 12 weeks' time we would like you to complete 6 of these questionnaires again which will take approximately 15 minutes, this is part B of the study. We will write to you to remind you to do this nearer the time. These questionnaires are designed to ask you about how you feel, think, cope and function with your bowel problems.

For example, you will be presented with a list of the ways you might have felt or behaved over a certain period and asked to respond on a scale. The examples of the types of questions that will be asked are shown below:

VIEWS ABOUT YOUR SYMPTOMS	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
When I am experiencing symptoms it is difficult for me to think of anything else					
I think a great deal about my symptoms					

We would also like to know if you would be willing to potentially talk to one of our researchers about how you feel, think, cope and function with your bowel problems. If you choose to take part in this stage of the research a member of the research team will interview you and will ask you a variety of questions about your bowel problems. This will be an individual interview between you and researcher only, no one else will be present. You will be asked to indicate your choice on the first page of the website.

What will happen if I take part?

Part A: If you decide to take part, then you will be asked to visit the following website to complete the questionnaires online:

https://www.surveymonkey.com/s/crohnsandcolitis1

You will also be asked to indicate your consent to take part in this study and to possibly being interviewed. If you require any help or advice to complete the questionnaires or would prefer paper copies then please contact Cheryl Jordan, details below.

We will then send you a reminder letter 12 weeks later which will ask you to visit the website again and complete part B, which is made up of 6 questionnaires.

We will be inviting a small number of people for an individual interview where we will be asking some questions about the way you cope with your bowel problems. If you are interested in taking part in this stage of the study please indicate this on the consent form which you will be asked to complete online prior to completing any of the questionnaires. If you are selected for this stage we will write to you and arrange a convenient time and place for you to meet with the researcher to carry this out. It may also be possible to carry this out over the phone. It will take a maximum of 1 hour of your time.

The responses from your questionnaires and/ or interviews will be put onto a database. We would like to access your medical records, with your consent, in

order to help us collect such information. This access to your notes will be for the purposes of this study only. Your name, and any other features that could identify you such as your hospital number, will NOT be included on the questionnaires or on the research database. We will use a 'code' instead that would link to your name on a list held separately from all the research information. You will be asked to enter this code when you go to the website to complete the questionnaires. You will find this code at the top of this letter.

What are the possible disadvantages of taking part?

As you are being asked about stress and other feelings you might have about your bowel problems, it is possible that you might feel upset when completing the questionnaires. If you should feel this way you can contact Cheryl Jordan (Cheryl.jordan@kcl.ac.uk 02078483285) to discuss this and the possibility of accessing longer term support.

What are the benefits of taking part?

Apart from possibly identifying that you have a need for further healthcare, this research will have no direct benefit to you. Nevertheless, once we have completed our study with a sufficient number of patients, we will combine as much information as possible, and publish our results. In this way, research results will be made available to the medical and scientific community. This may also benefit patients with inflammatory bowel disease in the future.

What if something goes wrong?

In the unlikely event you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, the normal National Health Service complaints mechanisms should be available to you.

Will my taking part in this study be kept confidential?

All information which is collected about you during the course of the research programme will be kept strictly confidential.

What will happen to the results of the research study?

We will publish the results so that as many of our findings as possible will be made available to the medical and scientific community. You will not be personally identified in any publication (i.e. your name and identity will not be mentioned in any report of the findings). Any data, information or quotes used in any publications which arise from this study will be anonymised. The timing of any publication will depend mostly on the speed with which we collect data and cannot be predicted with certainty.

Who is organising and funding the research?

The study is being organised by Cheryl Jordan lecturer at Kings College London in conjunction with Dr Bu Hayee, Consultant Gastroenterologist at Kings college Hospital NHS Foundation Trust. We are not paid for including you in this study.

Who has reviewed this study?

This study has been reviewed by the National Research Ethics Service, NRES committee London-Bloomsbury committee.

Contact details:

Cheryl Jordan

Florence nightingale school of nursing and midwifery

King's College London

James Clerk Maxwell Building

57 Waterloo Road

London

SE1 8WA

Email@ cheryl.Jordan@kcl.ac.uk

02078483285

Dr Bu Hayee

Kings College hospital

Floor 2 Hambleden Wing east

Denmark Hill

SE5 9RS

Many thanks for reading this information sheet.

Please keep it in a safe place.

Headed paper

CONSENT FORM: cohort study (20/6/12 V4) please initial all boxes

☐ I confirm that I have read and understand the information sheet dated **20/6/12** version 4 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐ I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

☐ I understand that relevant sections of my medical notes and data collected during the study may be looked at by individuals from Kings College London, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to y records.

☐ I agree to take part in the above study.

☐ I agree to possibly being contacted again to be interviewed about how I cope with IBD.

If you would prefer to be contacted by email about this and/or about when to complete the questionnaires again in part B of this study, please provide your address below:

☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent.	Date	Signature

Centre Number:

Study Number:

Patient Identification Number for this study:

Headed paper

CONSENT FORM: Interviews

Title of Project: Stress and inflammatory bowel disease

Name of Researcher: Cheryl Jordan

Please initial all boxes

- I confirm that I have read and understand the information sheet dated **20/6/12** (version 4) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

- I understand that relevant sections of my medical notes and data collected during the study, may be looked at by individuals from Kings College London, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐

- I agree to take part in the above study. ☐

- I agree to the interview being audio recorded ☐

We assure you that all your personal information and data will remain confidential at all times during and after research in accordance with the Data Protection Act 1998. Any data, information or quotes used in any publications which arise from this study will be anonymised

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent.	Date	Signature

Headed paper

Consent form: CBT Trial

Thank you for completing these questionnaires.

The questions will ask you about how you feel, think, cope and function at the moment.

The responses from your questionnaires will be put onto a database. Your name and any other features that could identify you will not be included on the questionnaires or database. We will use a code instead that will link your name on a list held separately from all other information.

The scores from the questionnaires may be used as part of service evaluation and may be part of a research report and used in research publications but under no circumstances will names or identifying characteristics be included.

Contact for further information

Cheryl Jordan

Florence Nightingale School of Nursing and Midwifery

King's College London

James Clerk Maxwell Building

57 Waterloo Road

LONDON, SE1 8WA

Email: Cheryl.jordan@kcl.ac.uk

If you are happy to complete the questionnaires please indicate your consent by placing your initials in the box below each statement.

1. I understand that while information gained from these questionnaires may be used as part of service evaluation and may be part of a research report and used in research publications, but under no circumstances will names or identifying characteristics be included.

2. I understand that while information gained from the questionnaires may be published, I will not be identified and my personal results will remain confidential.

3. I agree to complete the questionnaires.

4. Please type/sign your full name in the box below to indicate your consent to taking part

Appendix 5: Measures

Patient Health Questionnaire (PHQ-9)

Over the last two weeks, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things?	**Not at all 0**
	Several days 1
	More than half the days 2
	Nearly every days 3
Feeling down, depressed, or hopeless?	**Not at all 0**
	Several days 1
	More than half the days 2
	Nearly every days 3
Trouble falling or staying asleep, or sleeping too much?	**Not at all 0**
	Several days 1
	More than half the days 2
	Nearly every days 3
Feeling tired or having little energy?	**Not at all 0**
	Several days 1
	More than half the days 2
	Nearly every days 3

Poor appetite or overeating? **Not at all 0**

Several days 1

More than half the days 2

Nearly every days 3

Feeling bad about yourself - or that you are a failure or have let yourself or your family down?

Not at all 0

Several days 1

More than half the days 2

Nearly every days 3

Trouble concentrating on things, such as reading the newspaper or watching television?

Not at all 0

Several days 1

More than half the days 2

Nearly every days 3

Moving or speaking so slowly that other people could have noticed?
Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?

Not at all 0

Several days 1

More than half the days 2

Nearly every days 3

Thoughts that you would be better off dead, or of hurting yourself in some way?

Not at all 0

Several days 1

More than half the days 2

Nearly every days 3

Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer"*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	**Somewhat difficult**	**Very difficult**	**Extremely difficult**
☐	☐	☐	☐

The Short inflammatory bowel disease questionnaire (SIBDQ)

This questionnaire is designed to find out how you have been feeling during the last 2 wk. You will be asked about symptoms you are having as a result of your inflammatory bowel disease, the way you have been feeling in general, and how your mood has been.

1. How often has the feeling of fatigue or of being tired and worn out been a problem for you during the last 2 wk?

-All of the time 1
-Most of the time 2
-A good bit of the time 3
-Some of the time 4
-A little of the time 5
-Hardly any of the time 6
-None of the time 7

2. How often during the last 2 wk have you had to delay or cancel a social engagement because of your bowel problem? Please choose an option from
-All of the time 1
-Most of the time 2
-A good bit of the time 3
-Some of the time 4
-A little of the time 5
-Hardly any of the time 6
-None of the time 7

3. How much difficulty have you had, as a result of your bowel problems, doing leisure or sports activities you would have liked to have done over the last 2 wk? Please choose an option from

-A great deal of difficulty, activities made impossible 1
-A lot of difficulty 2
-A fair bit of difficulty 3
-Some difficulty 4
-A little difficulty 5
-Hardly any difficulty 6
-No difficulty; the bowel problems did not limit sports or leisure activities 7

4. How often during the last 2 wk have you been troubled by pain in the abdomen? Please choose an option from

-All of the time 1
-Most of the time 2

-A good bit of the time 3
-Some of the time -A little of the time 4
-Hardly any of the time 5
-None of the time 6

5. How often during the last 2 wk have you felt depressed or discouraged? Please choose an option from

-All of the time 1
-Most of the time 2
-A good bit of the time 3
-Some of the time 4
-A little of the time 5
-Hardly any of the time 6
-None of the time 7

6. Overall, in the last 2 wk, how much of a problem have you had passing large amounts of gas? Please choose an option from

-A major problem 1
-A big problem 2
-A significant problem 3
-Some trouble 4
-A little trouble 5
-Hardly any trouble 6
-No trouble 7

7. Overall, in the last 2 wk, how much of a problem have you had maintaining or getting to the weight you would like to be? Please choose an option from

-A major problem 1
-A big problem 2
-A significant problem 3
-Some trouble 4
-A little trouble 5
-Hardly any trouble 6
-No trouble 7

8. How often during the last 2 wk have you felt relaxed and free of tension? Please choose an option from

-None of the time 1
-A little of the time 2
-Some of the time 3
-A good bit of the time 4
-Most of the time 5
-Almost all of the time 6

-All of the time 7

9. How much of the time during the last 2 wk have you been troubled by a feeling of having to go to the toilet even though your bowels were empty? Please choose an option from

-All of the time 1
-Most of the time 2
-A good bit of the time 3
-Some of the time 4
-A little of the time 5
-Hardly any of the time 6
-None of the time 7

10. How much of the time during the last 2 wk have you felt angry as a result of your bowel problem? Please choose an option from

-All of the time 1
-Most of the time 2
-A good bit of the time 3
-Some of the time 4
-A little of the time 5
-Hardly any of the time 6
-None of the time 7

A simple index of Crohn's-disease activity (HBI)

Please circle the score which most represents your symptoms over the last 24 hours;

1. General well-being (*yesterday)*
Very well = 0
Slightly below par = 1
Poor = 2
Very poor = 3
Terrible = 4

2. Abdominal pain
(yesterday)
None = 0
Mild = 1
Moderate = 2
Severe = 3

3. Number of liquid or soft stools per day *(yesterday)* = _____

4. Abdominal mass
None = 0
Dubious = 1
Definite = 2
Definite and tender = 3

5. Complications
(check any that apply; score one
per item except for first box)
None
Arthralgia
Uveitis
Erythema nodosum
Aphthous ulcers
Pyoderma gangrenosum
Anal fissure
New fistula
Abscess

Simple Clinical Colitis Activity Index (SCCAI).

Please circle the score which most represents your symptoms over the last 24 hours;

1. (a).
How many bowel motions have you been passing during the daytime i.e. from waking up till going to bed to sleep for the last 3 days?

1 -3 times 0 Points

4-6 times 1 Point

7-9 times 2 Points

>9 times 3 Points

1. (b).
How many bowel motions have you been passing
during night time, i.e. after going to bed, for the last 3 nights?

1-3 times 1 Point
4-6 times 2 Points

2.
What degree of Urgency of defecation do you experience?
i.e. When you feel the need to open your bowel, how quickly do
you need to go?

I have no urgency at all (i.e. just as normal) 0 Points
I have to hurry to the toilet 1 Point
I have to go immediately 2 Points
have incontinence (unable to control the urge and had an accident) 3 points

3.
How much blood has been in your stool?

None 0 Points
Trace (a hint or a tiny amount) 1 Points
Moderate (occasional obvious/ blood) 2 Points
Severe (Usually obvious/frank blood) 3 Points

4.
General wellbeing –How do you feel about your general health?
Very well 0 Points
Slightly below par 1 Points

Poor **2 Points**
Very poor **3 Points**
Terrible **4 Points**

5.
Do you have any of the following symptoms apart from your bowels?

(a). Joint problems 1 Point
(b). Eye problems 1 Point
(c). Mouth problems 1 Point
(d)Skin problems 1 Point
(e) Do you have any tender, hot and red bumps which most often affect the skin on the shins, arms and legs ? 1 Point
(f) Perianal problems: Do you have any tears or breakdown (crack/ cleft) in the skin of the anus or tender lumps (abscesses) surrounding it? 1 Point

The Irritable Bowel Syndrome-Behavioural Responses Questionnaire (IBS-BRQ)

Please consider each question and mark the choice that best applies to you with an '×' in the appropriate box, from 1 (never) to 7 (always)

	1	2	3	4	5	6	7
I eat specific foods to help me open my bowels more							
I eat specific foods to help me open my bowels less							
I strain when opening my bowels							
After opening my bowels I check for blood							
After opening my bowels I check my stool for abnormalities							
I spend more time on the toilet than I ideally would like							
I often go to the toilet to open my bowels and then do not pass anything							
I often go to the toilet to pass water and find I open my bowels							
I avoid exercise when I have stomach pains							
I avoid certain foods when I have bowel problems							

I wear baggy clothing when my stomach feels bloated or distended							
I avoid going out in case I have problems with my IBD							
I avoid making plans in case I have problems with my IBD							
I carry other items (e.g.: wet wipes, sanitary towels, spare underwear) in case my IBD flares up							
I take medication (e.g.: before going out) just in case my IBD flares up							
I carry medication with me in case my IBD flares up							
I avoid sex in case my IBD flares up (and causes embarrassment)							
When I go out I make sure I know where the nearest toilet is							
I ask for reassurance about my IBD							
I avoid certain work situations (e.g. meetings) because of my IBD							
I avoid certain social situations (e.g. restaurants) because of my IBD							

I avoid certain foods (e.g. dairy products, spicy foods) because of my IBD							
After I open my bowels I wipe more than I would like							
When I have diarrhoea I do things to ease it (e.g. take **prescribed medication, take alternative medication)**							
I am constantly aware of my stomach							
I avoid staying away from home overnight in case my IBD flares up							

Hospital Anxiety and Depression Scale (HADS)

Tick the box beside the reply that is closest to how you have been feeling in the past week. Don’t take too long over you replies: your immediate is best.

A	**I feel tense or 'wound up':**	
	Most of the time	3
	A lot of the time	2
	From time to time, occasionally	1
	Not at all	0

D	**I still enjoy the things I used to enjoy:**	
	Definitely as much	0
	Not quite so much	1
	Only a little	2
	Hardly at all	3

A	**I get a sort of frightened feeling as if something awful is about to happen:**	
	Very definitely and quite badly	3
	Yes, but not too badly	2
	A little, but it doesn't worry me	1

	Not at all	0
D	**I can laugh and see the funny side of things:**	
	As much as I always could	0
	Not quite so much now	1
	Definitely not so much now	2
	Not at all	3

A	**Worrying thoughts go through my mind:**	
	A great deal of the time	3
	A lot of the time	2
	From time to time, but not too often	1
	Only occasionally	0

D	**I feel cheerful:**	
	Not at all	3
	Not often	2
	Sometimes	1
	Most of the time	0

A	**I can sit at ease and feel relaxed:**	
	Definitely	0
	Usually	1
	Not Often	2
	Not at all	3

D	**I feel as if I am slowed down:**	
	Nearly all the time	3
	Very often	2
	Sometimes	1
	Not at all	0

A	**I get a sort of frightened feeling like 'butterflies' in the stomach:**	
	Not at all	0
	Occasionally	1
	Quite Often	2
	Very Often	3

D	**I have lost interest in my appearance:**	
	Definitely	3
	I don't take as much care as I should	2
	I may not take quite as much care	1
	I take just as much care as ever	0

A	**I feel restless as I have to be on the move:**	
	Very much indeed	3
	Quite a lot	2
	Not very much	1
	Not at all	0

D	**I look forward with enjoyment to things:**	
	As much as I ever did	0
	Rather less than I used to	1
	Definitely less than I used to	2
	Hardly at all	3

A	**I get sudden feelings of panic:**	
	Very often indeed	3
	Quite often	2
	Not very often	1
	Not at all	0

D	**I can enjoy a good book or radio or TV program:**	
	Often	0
	Sometimes	1
	Not often	2
	Very seldom	3

Beliefs about Emotions scale (BES).

Please tick the column that best describes how you think. Please note that because people are different, there are no right or wrong answers to these statements. To decide whether a given answer is typical of your way of looking at things, simply keep in mind how you think most of the time.

	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree Very much	Totally disagree
1. It is a sign of weakness if I have miserable thoughts							
2. If I have difficulties I should not admit them to others.							
3. If I lose control of my emotions in front of others, they will think less of me							
4. I should be able to control my emotions.							
5. If I am having difficulties it is important							

to put on a brave face.							
6. If I show signs of weakness then others will reject me.							
7. I should not let myself give in to negative feelings.							
8. I should be able to cope with difficulties on my own without turning to others for support.							
9. To be acceptable to others, I must keep any difficulties or negative feelings to myself.							
10. It is stupid to have miserable thoughts.							

11. It would be a sign of weakness to show my emotions in public.							
12. Others expect me to always be in control of my emotions							

.

CHRONIC PAIN ACCEPTANCE QUESTIONNAIRE (CPAQ).

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices. For instance, if you believe a statement is 'Always True,' you would write a 6 in the blank next to that statement.

0	1	2	3	4	5	6
Never true	Very rarely true	Seldom True	Sometimes true	Often true	Almost Always true	Always true

_____ 1. I am getting on with the business of living no matter what my level of symptoms is.

_____ 2. My life is going well, even though I have symptoms.

_____ 3. It's OK to experience symptoms.

_____ 4. I would gladly sacrifice important things in my life to control my symptoms better.

_____ 5. It's not necessary for me to control my symptoms in order to handle my life well.

_____ 6. Although things have changed, I am living a normal life despite my symptoms.

_____ 7. I need to concentrate on getting rid of my symptoms.

_____ 8. There are many activities I do when I have symptoms.

_____ 9. I lead a full life even though I have symptoms.

_____ 10. Controlling my symptoms is less important than any other goals in my life.

_____ 11. My thoughts and feelings about symptoms must change before I can take important steps in my life.

_____ 12. Despite the symptoms, I am now sticking to a certain course in my life.

_____ 13. Keeping my symptoms under control takes first priority whenever I'm doing something.

_____ 14. Before I can make any serious plans, I have to get some control over my symptoms.

_____ 15. When my symptoms increase, I can still take care of my responsibilities.

_____ 16. I will have better control over my life if I can control my negative thoughts about my symptoms.

_____ 17. I avoid putting myself in situations where my symptoms might increase.

_____ 18. My worries and fears about what symptoms will do to me are true.

_____ 19. It's a great relief to realize that I don't have to change my symptoms to get on with life

_____ 20. I have to struggle to do things when I have symptoms.

Cognitive behavioural responses to symptoms questionnaire (CBRQ).

Please indicate how much you agree or disagree with the following statements about your current symptoms by ticking the appropriate box.

	0 **Strongly disagree**	**1** **Disagree**	**2** **Neither disagree or agree**	**3** **Agree**	**4** **Strongly agree**
I am afraid that I will make my symptoms worse if I exercise					
My symptoms would be relieved if I were to exercise					
Physical activity makes my symptoms worse					
The severity of my symptoms must mean there is something serious going on in my body					
Even though I experience symptoms, I don't think they are					

actually harming me					
When I experience symptoms, my body is telling me that there is something seriously wrong					
I am embarrassed about my symptoms					
I worry that people will think badly of me because of my symptoms					
I am ashamed of my symptoms					
I think a great deal about my symptoms					
My symptoms are always at the back of my mind					
I spend a lot of time thinking about my illness					
I tend to overdo things when					

I feel energetic					
I find myself rushing to get things done before I crash					
I tend to overdo things and then rest up for a while					
I stay in bed to control my symptoms					
I tend to nap during the day to control my symptoms					
I sleep when I'm tired in order to control my symptoms					

Appendix 6: : Cognitive behaviour therapy for distress in people with Inflammatory Bowel Disease: A bench marking study

The template for intervention description and replication checklist and guide (TIDieR)

Item	Location of information
1) Brief Name of the intervention)	Pg. 199 paragraph 1
2) Why (rationale, theory or goal of intervention)	Pg. 199 paragraph 1 Pg. 202 paragraph 2
3) What: Materials utilized **4) What : Procedure followed**	Pg. 202 paragraph 2 Pg. 203 paragraph 1
5) Who provided:	Pg. 204 paragraph 1
6) How: modes of delivery	Pg. 202 paragraph 1 & 2
7) Where: Location of where intervention occurred.	Pg. 196 paragraph 3 Pg.197 paragraph 1
8) When and how much; no of sessions, time scale.	Pg. 203 paragraph 1
9) Tailoring of intervention	Pg. 202 paragraph 2 Pg. 203 paragraph 1
10) Modifications	The intervention was not modified during the course of the study
11) How well; Planned (intervention adherence.	Not assessed